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LAKE CARRIERS' ASSOCIATION.

To consider and take action upon all general questions relating to the navigation and carrying business of the Great Lakes, maintain necessary shipping offices and in general to protect the common interest of Lake Carriers, and improve the character of the service rendered to the public.

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REPORT ON THE ERIE CANAL.

Supt. Hannan, of the New York State Department of Public Works, N. Y., in his annual report to the legislature, says that the expenses of operating the canals last year and making the ordinary repairs were $726,086, which were the lowest annual expenses since 1886.

The canal electrical experiments are referred to at considerable length. The superintendent quotes a report made by expert Barnes which says: "In regard to the cost of electrical propulsion, but little definite knowledge can be deduced from the experiments. The essential element in the case is the cost of establishing and maintaining the necessary power along the line of the canal. I have made an approximate and very conservative estimate of the cost of equipping and operating a steam and electric plant capable of supplying with necessary power at least 200 canal boats distributed over a length of 50 miles of canal. Assuming that this plant is in operation not more than 210 days in a year, which is the ordinary limit of the season of navigation, my computations show that the cost will be somewhat less than 10 cents a mile a boat; and if the power-generating machinery can be used profitably during the remainder of the year in supplying power to manufacturing establishments in the vicinity of the station, the cost of the canal propulsion will be correspondingly reduced. This computation refers to a speed of 3½ miles an hour for the boats, and that two boats are coupled together. While the foregoing estimate is based upon the delivery of a current of limited voltage produced by steam power, the promoters of the electrical system of propulsion expect to obtain the necessary power at very low rates from turbines at Niagara Falls, and to use a current of much higher voltage with a variety of new methods of transmission and transformation, whereby a great reduction in cost of delivery to motors in canal boats is anticipated. From well-known and competent electrical authorities, I am assured that by the contemplated methods of obtaining and delivering the power, the cost of propelling boats by electricity will not exceed five cents a boat a mile. It will, therefore, be seen that the claims to consideration of electricity as a motive power on the canal are extremely well founded, and that its development is worthy of the utmost encouragement. It is to be hoped the experiments will be continued on a more elaborate and satisfactory scale next year.

Navigation during the past season has been remarkably good. The whole number of tons carried on the canals of this state during the season of 1893 was 4,331,963. Compared with 1892, there is a gain of 49,968 tons.

PROPAGATING FISH.

The New York state commissioners of fisheries report that last year they succeeded in distributing over eighty millions of the best varieties of fishes in the waters of the state. This exceeds by fifty per cent. the production of any previous year. The commissioners have devoted a large part of their time to the protection and distribution of food fishes. While not neglecting the distribution of what may be more strictly termed game fish, such as trout and black bass, they give the greatest energy to the artificial propagation of shad, pike, perch, white fish, tom cods, smelts, lake trout and lobsters.

THE HERRESHOFFS.

It is a well known and pathetic fact in the lives of the family of the Herreshoffs, the boat builders of Bristol, R. I., that four of them, three brothers and a sister, are blind. John Herreshoff, who is said to be the smartest of the builders, is entirely blind. His brother, who designs, has of course, the normal use of his eyes. The family, as the name indicates, is of German nationality, and their manners are blunt and plain, even to those coming to them with large commissions for yacht building. A former neighbor says that John H. was born blind, as was also another of the four. The other two gradually lost the use of their eyes. At one time it is said by a former neighbor, their finances were very low, but their father came to their aid and they pulled through and have since built up comfortable fortunes.

THE SAULT AND SUEZ CANALS.

The commerce that passed the Sault canal at the eastern end of Lake Superior aggregated a value of $145,446,000 wheat and flour, making $62,300,000 of the total, says Bradstreet. Of jobbers' goods $25,000,000 worth passed the canal, chiefly west-bound, while copper, iron, coal and lumber reached totals of from $10,500,000 to $17,500,000 each. As showing the growth of this canal and its relation to that other great waterway, the Suez canal, the following totals can be given:

	No.	Tonnage.
Suez:		
1890	3,389	6,890,014
1891	4,207	8,698,770
1892	3,559	7,012,028
Sault:		
1890	10,557	9,041,213
1891	10,191	8,888,759
1892	12,580	11,214,333
1893	12,008	10,796,572

EARNED A PREMIUM.

The speed of the cruiser Olympia, built by the Union Iron Works, San Francisco, on her trial trip in Santa Barbara channel, admits of a premium of $400,000 being paid to her builders.

NORTH PACIFIC PILOT CHART.

The Pilot Chart of the North Pacific Ocean for January, 1894, has been prepared from the most reliable data at present available. Its purpose is to illustrate the character of the monthly publication which has been planned by the Hydrographic Office for the benefit of the maritime public of the Pacific coast. The Secretary of the Navy has submitted, in his estimates of appropriations required for the service of the fiscal year ending June 30, 1895, an item of $10,000 for the publication of this chart. If Congress should grant this sum, it is proposed to issue, on the first day of each month, an edition of the chart showing graphically such information of timely interest and warning to mariners as can be collected from the reports of incoming navigators. It will represent, for the succeeding month, by deduction from the series of observations that have been for many years collecting at the Navy Department in Washington, the winds and currents to be expected, the regions of prevailing fog and rain, the normal states of the barometer and thermometer, the feeding grounds of whales and seals, and the most advantageous routes to be followed by sail and by steam.

The support and co-operation of mariners and of all others interested in shortening the duration of voyages of commerce, in enhancing the safety of navigation, and in improving our knowledge of the winds, currents and storms of the Pacific, are asked in this undertaking, and they are invited to state their opinions as to what matters of practical value should appear on the chart.

The Hydrographic Office has access to the great libraries and repositories of information that the mariner has not time nor opportunity to consult. By collecting and digesting in this office the nautical information from all quarters in the Pacific, the benefits resulting from the combined experience of the mariners of that ocean are made available for the individual.

NEW RIVAL FOR LLOYDS.

Under the above caption a Bay City dispatch states as follows: "The American Shipmasters' Association, which has a practical monopoly of the rating of American vessels for the underwriters east, has entered the field on the Great Lakes in opposition to the Inland Lloyds, and will publish a complete rating of lake vessels for the coming season. Competent shipbuilders are already at work on the necessary inspections, and the work will be completed ahead of the annual publication of the Inland Lloyds, The ratings will be made without dictation from interested parties. Last year the representative underwriters and the vessel owners held a well attended session at Detroit, at which time it was determined that numerous changes should be made in the methods formerly in vogue, but a great many good resolutions and heaps of talk produced no appreciable result later."

"It is alleged, too, that the Buffalo underwriters have had the upper hand in connection with the Lloyds ratings and used their advantage to the detriment of underwriters at Chicago, Detroit, Milwaukee and all around the lakes. It has been customary in the past to place no insurance until after the annual publication of the Lloyds register was in the hands of all the underwriters. The claim is made that last year the Buffalo men secured the ratings, wrote the changes made in an old book, and then sent representatives around the lakes, securing all the cream of the business before their competitors were ready to do business at all. At smaller ports, such as Bay City, the Buffalo people didn't even protect their local representatives, their traveling agents took the business that had formerly been handled locally."

NEWS AROUND THE LAKES.

CHICAGO, ILL.

Special Correspondence to The Marine Record.

Chicago tugs are now doing towing in the river at 40 per cent. below the regular tariff.

It is reported that Capt. Robt. C. Reid will have command of the steam barge M. F. Butters, next season.

Capt. R. C. Brittain arrived in this city from Saugatuck, Tuesday.

Capt. John McNeil returned Monday from his home at Bay City, where he had spent the holidays.

I hear from fairly good authority that Capt. Zealand will not take charge of the big steel steamer E. C. Pope next season.

R. Cuson, ships-husband of the D. C. Whitney fleet, arrived here Monday from Detroit to look after the fleet at this port.

E. W. Heath, shipbuilder, Benton Harbor, is building a fishing tug for the Connable Fishing Co. Her dimensions are 76 feet over all, 16 feet beam, 8 feet hold.

Fitzsimmons & Connell's new tug was successfully launched at Benton Harbor, Saturday, by E. W. Heath, her builder. She was named the Tacoma.

In going my rounds I often drop into H. Lewis & Co., marine oil supply men, where I find many marine engineers who use the firm's oils.

The Shipmasters' Association, Branch 3, Chicago, banquet and ball, to be held at the Tremont House, on Wednesday evening, January 17th, will, it is anticipated be a grand success.

Engineers James Neelis and Tom Long commenced work on the steam barge Hattie B. Pereue this week, making some alterations and improvements to her machinery, prior to fitting her out in the spring.

H. W. Greene, sailmaker, was in this city Tuesday. He was engaged last year at West Bay City, making the sails and outfits for vessels built by Capt. James Davidson.

The schooner Iron Cliff was towed to elevators Saturday and Monday by I. T. Line tugs to load 66,000 bushels of corn, for which she was chartered by J. G. Keith & Co., in December.

I am sorry to learn that Capt. J. W. Calbick, of the firm of Cook, Calbick & Co., vessel agents, is very sick from a severe attack of grip, which has compelled him to remain at home for the past few days. I sincerely wish him a speedy recovery to his usual good health.

At Miller Bros. shipyard the steamer Delaware is in dock for some repairs and calking, the steamer J. H. Prentice some repairs and recalking bottom, the tug G. W. Gardner for some new frames and plank forward, the tug D. G. Helen for calking bottom and ironing.

P. H. Fleming, vessel and insurance agent, went to Cleveland Tuesday night to appear in the admiralty court there as the plaintiff in the suit of the schooner Schuylkill versus the tug Dan Connelly. Mr. Fleming formerly owned the Schuylkill.

A. W. Goodrich, Capt. J. W. Gilman and Geo. Hurson, of the Goodrich Transportation Co.; William L. Brown, Esq., of the Chicago Ship Building Co., and J. H. Channon, of the firm of H. Channon Co., ship chandlers, attended the launch of the splendid steamer Northwest, at the Globe Iron Works shipyard, at Cleveland, last Saturday.

The schooner Mediator was sold at sheriff's sale here Monday afternoon to Otto Schuneman, coal and wood dealer, consideration $4,350. The Mediator is an excellent schooner, with a carrying capacity of 300,000 feet of lumber. She was rebuilt last year by R. Thoreson & Co., shipbuilders, Manistee, at a cost of about $3,500, and she has a first-class outfit.

The steamer New York was towed away from Peabody's coal dock, where she had been unloaded Monday, and the steamer R. E. Schuck took her place to unload. The steamer Parks Foster is laying outside the Schuck waiting her turn to unload. There are several more steamers also waiting their turns. It is estimated that he Peabody Coal Co. had some 45,000 tons of coal afloat in Chicago river at the close of navigation.

Grain freights have taken a tumble. Some owners are offering to take 2½ cents on wheat and 2½ cents on corn but there is very little demand even at those low figures. One vessel agent, however, informed your correspondent that he refused 2¾ cents on a cargo or 60,000 bushels of corn this week; his reasons for so doing was that the railroad companies which had been cutting rates agreed to restore old carrying rates, and that he thought grain freights by the lakes would improve ere long.

At a meeting of the Marine Engineers' Beneficial Society, Branch No. 4, Chicago, held at their hall, Friday January 5th, the following officers were installed for the ensuing year. Thos. D. Dowd, president; John Reifs, vice president; James Donelly, treasurer; D. W. Wise, financial secretary; James McCauley, recording secretary; John McEllicott, corresponding secretary; Wm. Leonard, conductor; J. Doyle, chaplain; P. Lee, doorkeeper; Geo. Galavin, John Reifs, William Ponsonby, trustees; Thos. F. Dowd and M. Conley, delegates to the M. E. B. Association's convention to be held at Washington, January 22d. The M. E. B. A. have added four new organizations to their association which now numbers 101 branches working under the national body, and notwithstanding the dull times the membership has steadily increased. The total membership up to date is about 8,000, all licensed marine engineers.

DULUTH AND SUPERIOR.

Special Correspondence to The Marine Record.

There is a possibility that work on a small scale will begin at the steel barge plant soon, but nothing definite is known yet.

On the Mesaba range all operating mines but one have closed for the winter, and the greatest dullness prevails. It looks as if little would be done there till March. The Minnesota Iron Co. is the only operator on that or the Vermilion range at present, keeping 900 men on the latter alone, while it operates the Canton on the Mesaba and has let two large stripping contracts for immediate execution.

Wheat receipts for the past week were only about 200,000 bushels and the stock now on hand is 9,578,000 bushels, against 15,627,000 the same week last year. At that date there was an increase of stocks of 620,000 bushels for the week. Wheat continues to move slowly. The Belt Line, Superior Terminal aud Duluth Elevator Co's. houses are all about full, the other companys holdiug but little. Flour grinding is very light, nearly all the mills being shut down. Last week's output was 37,111 barrels, and shipments were 27,747 barrels.

The new Meyerhauser syndicate sawmill, which is to be built on Lake Nebogemain, 20 miles east of Superior, on the Duluth, South Shore and Atlantic road, will be a goodly addition to the mills that will be prepared to ship by water. It will cut not far from 30,000,000 feet a year. The small mill of Hubbard & Vincent, which burned last fall, is being rebuilt and has a contract to saw exclusively for the eastern market. The Duncan Brewer & Co. mill, which was also burned, starts up next week, and will run till fall, for the eastern market largely. The new Murray & Co's. mill, which will be ready by April, is also in the same trade. But loggers do not expect so great a business as in preceding years.

Probably the most important item of the week so far as shipping circles are concerned, is the decision of the Minnesota supreme court against the building of a state grain elevator here. The court below had held the act of authorization good, and under that decision the railroad commissioners had purchased a site and let a contract for the work. The decision declares that chapter 30, laws of 1893, entitled "An act to provide for the erection of a state elevator or warehouse at Duluth, for public storage of grain, and so forth," is not an exercise of the police power of the state to regulate the business of weighing, receiving and inspecting grain elevators. The act in question is in violation of the state constitution, providing that the state shall never contract any debts for work of internal improving or to be party in carrying on such work. So the long cherished dream of the populists that their wheat should get to Europe unmixed with the pauper product of other states, will not be realized any more fully than it has been in the past.

CLEVELAND, O.

I learn from the best authority that Capt. Goodfellow, well known in Canada as an expert compass adjuster, died at his home in Toronto this week.

Mr. David Carter, general manager of the D. & C. line, with offices in Detroit, is in the city this week on business for his company.

The annual meeting of the Lake Carrier's Association, to be held in the Cadillac House, at Detroit, on Wednesday next, January 17th, is expected to be the best attended meeting that ever a marine transportation society has enjoyed. No objection prevailing the association will be incorporated.

The schooner Queen City is receiving three new masts. Repairs are also being made on the steamer Nahant Both these vessels are owned by Capt. Benham.

The Cleveland Ship Building Co., are "laying on their oars" until new tonnage comes into demand again. While the shipyard is idle however, there is quite a large industry carried on in the machine shops both in new and repair work.

The new fire boat is nearly planked and her engines and pumps are also well along. May 1 is the date placed for her delivery. It is known that if the new fire boat is found satisfactory Manning is likely to receive an order from another city for a sister boat.

Capt. Campau, of the steamer Northern King, has been selected for the command of the magnificent new Northern Steamship Line passenger steamer Northwest. Capt. Campau undoubtedly merits the promotion, which carries with it a position of the greatest responsibility, because of the speed with which the steamer is expected to be run in fairly crowded waters.

The dry docks at this port are meeting with a large patronage and not often can a dock be found empty. The new and enlarged dock of the Cleveland Dry Dock Co. is kept busy. The leakage that was so annoying to the dock owners for some time has now been practically overcome and they now have a good tight dock.

A meeting of prominent citizens was held in the Board of Trade rooms this week to protest against the Wilson bill. Hon. Tom L. Johnson, Congressman for this district, was roundly scored, and it was ordered that the resolutions adopted at the meeting should not be forwarded to him.

Hon. R. C. Parsons will leave for Washington in a few days to lay before Congressmen the opposition of the vessel owners of Cleveland and other lake ports to the free ore clause of the Wilson bill, and the reasons for their opposition. A delegation of owners will also visit Washington for the same purpose.

Phil D. Sloan is no longer inspector of the construction of the fireboat now building for the department. V. D. Nickerson, of 29 Fulton street, has been appointed. Director Hyman found that there had been slight deviations from the specifications in the work on the boat and will see that the contract is closely lived up to.

Capt. Samuel W. Gould, 265 Marcy avenue, ex-assistant inspector of steam vessels at this port, will open a nautical academy for the instruction of officers desiring to obtain licenses from the local steamboat inspectors. He will also give instruction in the safety valve and other mathematical problems required of engineers at their examination for licenses.

The Globe Iron Works Co. evidently intend to keep their immense plant busy even in the face of dull times, it is now learned that they will lay the keel of a steel steamer on builder's account, having the following dimensions: 324, 42 and 28 feet. The firm of L. P. & J. A. Smith have also placed an order for one 80 feet and two 55 feet steel tugs to operate on their 20 foot channel contract.

The municipal government now talk about extending Erie street and Lake View Park out into the lake, much as the Lake Shore Railroad company has done with their property. The harbor lines established by the Federal government, and outside of which the U. S. engineer in charge of the district will permit no obstruction, is 1,225 feet from the present shore line. Up to this point the city has a right to reclaim land on the shore line.

Among the many out of town people who attended the launch of the Northwest from the Globe yards on Saturday were, M. M. Drake, of Buffalo; W. A. Livingston, Frank E. Kirby, and F. A. Kirby, Capt. J. W. Westcott, and John Parker, H. H. Medry and Frank E. Fisher, of Detroit; John Craig and son, of Toledo; President Brown, of the Chicago Shipbuilding Co.; Mr. Currier, of Boston, chief engineer of the yacht Wild Duck; James H. Channon and G. S. Whistler, of Chicago; Mr. Mather, from Philadelphia, representing the foreign underwriters on the boat; Capt. Gilman, manager of the Goodrich fleet, Chicago; Mr. A. W. Goodrich, president of the Goodrich Transportation Co.; Secretary Hurson of the same line; N. W. Crossman, and Mr. and Mrs. Homer J. Carr, of Chicago; General Passenger Agent Carpenter, of the Northern Steamship Line, accompanied by a dozen Buffalo newspaper men; and William Gaskin, of the Union Dry Dock Co., Buffalo; also Mr. Howard H. Baker, Buffalo. Among the ten thousand, this port was of course more than represented as I sighted Mr. and Mrs. L. C. Hanna, M. A. Hanna, Miss Lillian Hanna, Mrs. H. M. Hanna, L. E. Holden, Daniel Hanna, J. K. Bole, A. E. Saunders, Robert Wallace, H. H. Brown, William M. Fitch, James Wallace, John Tod, W. J. McKinnie, W. D. Rees, Capt. A. R. Manning, Judge William B. Sanders, James H. Dempsey, A. Teachout, Rev. Lloyd Darsie, C. E. Bolton, Thomas E. Quayle, Capt. George P. McKay, John H. Farley, W. A. Madison, Mayor Robert Blee, C. C. Harris, Thos. Bristow, Capt. William S. Mack, Capt. Chris Allen, Mr. Logan, Mr. Biddle, the Weather Bureau official Major Stockman, and of course Mr. John F. Pankhurst, Luther E. Allen and other officials of the Globe Co.

OWEN SOUND, ONT.

Special Correspondence to The Marine Record.

Capt. John Simpson has twenty men at work on the S. S. Myles.

The C. P. R. steamers Alberta and Athabasca are to have their decks overhauled.

Our new Mayor will do his best to have our harbor deepened to twenty feet, I hope he succeeds.

The outcome of the Wilson Tariff Bill is eagerly looked for here, especially as regards lumber.

Query for Owen Sound merchants to answer. Why did the North Shore Navigation Co., not lay up one of their steamers here as promised?

The steamer Myles while disabled out in the bay whistled for the City of Collingwood, (Capt. Bassett) to come to her; Capt. Bassett not knowing what the whistles ment, or not caring, kept on his course for Collingwood and there went into winter quarters. Capt. Mackay, of the Myles said he wanted to transfer his deck load of car wheels on her and get him to tow her to Collingwood. The government cruiser Petrel, towed her in here. What was Collingwood's loss was Owen Sound's gain. MARINE.

DRAINING THE LAKES.

Prof. G. F. Wright lectured before the Historical society of Cleveland in Association hall on Wednesday evening on "The Geological History of the Great Lakes."

"The five Great Lakes which empty into the Gulf of St. Lawrence," said Prof. Wright, "constitute, with their connecting streams, the most magnificent inland water navigation of the world. They drain an area of 457,000 square miles—about twelve times the size of Ohio. So delicately balanced are they upon the divide between the Gulf of St. Lawrence and the Gulf of Mexico that it seems but a mere matter of chance which way the waters should flow. A ridge of gravel but eight feet in height is all that prevents the water of Lake Michigan from flowing across Chicago into the Desplaines river and thence through the Illinois into the Mississippi. The city of Chicago at the present time is vigorously at work upon a great canal designed to draw from Lake Michigan a sufficient stream of water to discharge all its sewage into the Illinois river. The city contemplates withdrawing from Lake Michigan no less than 600,000 cubic feet of water per minute. This will form a stream 160 feet wide at the bottom and 18 feet deep, flowing three miles an hour.

"It is estimated that the water thus diverted from the Great Lakes will raise the low water level of the Illinois river about seven feet, that of the Mississippi river at St. Louis at least one foot, and probably six inches at Cairo at the junction with the Onio river." (Cothrell, Trans. Canadian Soc., 1891, p. 40.) The question, therefore, is one of special interest to all the towns upon the Lakes, and is even international in its significence; for at first sight it would seem that the abstraction of such a body of water from the Lakes might seriously effect their level and so inflict injury upon the great vested interests that have grown up in connection with present conditions.

"Geologically it is to be noted that these Great Lakes lie near the northern border of the vast system of sedimentary rocks which completely cover the Mississippi basin. To the north of the Great Lakes the rocks are nearly all granitic in their character. The region between the Great Lakes and Huron bay is looked upon by geologists as one of the oldest land surfaces in the world. Through countless ages the wash from the vast mountain systems which characterized this area was carried down into the shallow seas which spread over the Mississippi valley, and slowly built up the thick deposits of conglomerate, sandstones, shale and limestones which at the present time cover the area south of the Lakes. In Newburg, wells have been sunk more than 3,000 feet through sedimentary rocks without reaching the underlying granite.

"This long period of deposition in the inland seas of Mississippi valley continued during all the Huronian, Cambrian, Silurian, Devonian and Carboniferous periods, occupying many millions of years. At length there came a period of continental elevation, raising the whole interior of the eastern part to an elevation of 3,000 or 4,000 feet.

"The first stages in the history of the Great Lakes begin with this continental elevation, which was of course a period of rapid valley erosion. As the land slowly rose the gradient of the streams increased and the whole continental area was cut up into a vast network of canons and expanded river valleys. Where the rocks were specially obdurate, deep cannons were formed; which in the areas, which were covered with softer rocks, the gorges became broadened into valleys of varying width. The Hudson river at the present time illustrates the work which went on extensively over the larger area. This river encounters hard rocks at the highlands in the vicinity of West Point. The task of sawing down through this obstacle was so great that during its progress large areas of softer rocks to the north were worn away meanwhile and carried down the streams as sediment. An obstruction of the narrow valley at West Point would now produce a broad shallow lake to the north something like Lake St. Clair.

"A noteworthy feature of the Great Lakes is that, with the exception of Lake Erie, they all descend below the level of the sea. The surface elevation of the upper four is from 573 to 600 feet above the level of sea, but the bottom of Lake Superior is 400 feet below sea level; of Lake Huron, 120 feet; of Lake Michigan, 280 feet; while the bottom of Lake Ontario is 507 feet below the level of the sea. The bottom of Lake Erie nowhere decends to the sea level.

"Inspection of the strata of rock around these lakes shows that, with the exception of Lake Superior, the strata surrounding them are nearly horizontal, showing that they are valleys of erosion."

Prof. Wright referred to the discussion going on regarding the Cincinnati ice dam and the gravel terraces attributed to it in the upper Ohio river and its tributaries. This part of the trough of the Ohio river marks the rapid erosion which accompanied the continental uplift. He claimed that the erosion below the high level gravel deposits along the Ohio and Allegheny rivers was preglacial. This he settled by a personal investigation. The speaker stated a succession of facts about the Great Lakes from the time preceding the glacial period. He declared that the magnificent fresh lakes were formed by a series of glacial dams and are all glacial mill ponds. Continuing, he said:

"The dams of which we have spoken, which keep the lakes at their present stages, are glacial deposits of gravel and clay, forming permanent obstructions. But, as the ice came from the north it must, during its recession, have remained much longer over the country to the north of the lakes than over that to the south of them. We have thus brought to view an immense temporary ice dam which produced some very interesting results. So long as the ice lingered across the valleys of the Mohawk and the St. Lawrence, the drainage of the whole region would have to seek an outlet to the south. During that time the water would be held up to the level of various passes leading into the Mississippi basin. Of this state of things we have most convincing direct evidence in the lake ridges of this region with which all are familiar. About five miles southwest of Cleveland, the Cleveland, Columbus & Cincinnati railroad passes under a ridge of sand which is 175 feet above the lake. This ridge is an old shore line of the lake, and can be followed westward through Ridgeville, Elyria, South Amherst, Norwalk, Tiffin, Findlay and Van Wert to Ft. Wayne, Ind., where the water from the Maumee valley poured over into the Wabash at just about the level of this ridge.

"Euclid avenue is another sandy ridge, marking a short line about eighty feet lower than the previous one. This too can be followed westward of the Cuyahoga along Detroit street, through North Amherst, Bellevue, Fostoria and Bellmore, and thence beyond the Maumee river, bending northward to the vicinity of Adrian, Mich. The outlet of the lakes during the time of the formation of this beach was probably from Saginaw bay through the Chicawassa into the headwaters of the Grand river in Michigan, and thence into the Illinois. At a later stage, when the ice had melted to the north of the Straits of Mackinac, the drainage went around by that channel and the ridges which appear but from thirty to fifty feet above the lake around its western portion were formed. Thus we have in the lake ridges a pretty definite record of the stages through which the ice passed in its slow retreat to the north.

"But there are still two more chapters to the history. The delicate balance on which the existence of the lakes depends is seen not only in the correspondence of the level maintained by the outlet of Lake Erie over Niagara with that of the deserted outlet from Chicago into Illinois, but there is a fourth pass which could be made an outlet by a slight change of level. The difference between the level of the Niagara river and that of the ridge west of Chicago separating Lake Michigan from the Illinois river is only about twenty feet, so that a depression at Chicago of fifty feet, or an elevation of the same amount at Niagara, would permanently turn the drainage of the Great Lakes into the Illinois. On the other hand, when we consider the fourth low pass we find that a change of level of 100 feet along the line of the Canadian Pacific railroad, extending from the Ottawa river to Lake Nipissing, would permanently turn the drainage arouud to the north, robbing Niagara of all its glory. Of the evidence that after the glacial period the drainage for a while actually took this course I have already written somewhat fully in the columns of the Cleveland papers. I need, therefore, but briefly restate the points.

"In an expedition taken in 1892 with Judge C. C. Baldwin and his brother, D. C. Baldwin, and Prof. A. A. Wright, of Oberlin, we found to our surprise, that when standing between the waters of Lake Huron and those of the Ottawa river at North bay on Lake Nipissing, we were almost exactly upon the same level with Euclid avenue in Cleveland. As we knew that at the close of the glacial period there was a northerly depression of the land, amounting to 500 feet in Montreal, we reasoned that this would have depressed the watershed on which we stood sufficiently to turn the drainage of the lakes around by that channel into the Ottawa river. On further investigation we found satisfactory evidence that this was the case. A very distinct beach line extends from Lake Nipissing around to the headwaters of the Mattawa, a branch of the Ottawa. On following this stream down to its junctiou with the Ottawa, we there found an enormous bowlder terrace, which had been pushed clear across the Ottawa, so as to dam it up and produce slack water navigation above and rapids below. The whole situation of the deposit was such as would have been produced by the mighty torrents which we had supposed to exist, and so far as we could see could not have been produced by any other known force.

"The bearing of this discovery upon the calculations of the date of the glacial period derived from the recession of the Niagara gorge is important. The Niagara gorge is seven and a half miles long and represents the work done by the river since the ice melted off from the Mohawk valley and draw the water down to the level of Lake Ontario. If the rate of recession had been from the beginning as rapid as it is at the present time, this work would have been accomplished in about 7,000 years. But now we must add to this period the length of time during which the drainage of the Great Lakes passed through the Nipissing-Ottawa outlet, and left Niagara dry land. But I think there is evidence that after the melting of the ice from the north the land regained its present altitude pretty rapidly, as geological time is recokned. At the rate with which changes of level are now taking place in various portions of the earth, 2,000 and 3,000 years would be all the time that would be required to raise the depressed Nipissing outlet above the level of the Niagara outlet. The Niagara chronometer, therefore, is not likely to vary more than 2,000 or 3,000 years from the correct time, and we may still say with much confidence that the close of the glacial period in eastern North America was not more than 10,000 years ago.

"But what of this new outlet which the gigantic city at the head of Lake Michigan is proposing to make? When it is said that Chicago is to turn a stream from Lake Michigan into the Illinois river, which is 160 feet wide and 18 feet deep, and which is to flow three miles an hour, and whose volume is so great as to raise the level of the Mississippi river at St. Louis a foot, does not that give occasion of alarm to cities like Detroit, Toledo, Sandusky, Cleveland, Erie and Buffalo, and to all shipowners upon these lakes? I know that considerable alarm has been felt in some quarters in view of the diversion of so much water from the basin of the St. Lawrence into the basin of the Mississippi. But the Chicago engineers maintain that there is no occasion for such alarm. According to them the utmost which such a stream could do would be to lower the level of Lakes Michigan, Huron and Erie about three inches, which would not be felt in the high water which is maintained through most of the season of navigation, and which would not be minded at all in the winter, which is the season of low water. Fortunately the canal at Chicago does not follow the preglacial channel, from which it might scour out the loose material and so enlarge indefinitely the volume of water, but is dug across a rocky barrier where it will be completely under control. Still, with the great prospective growth of the city and the loud demand for a ship canal to the Mississippi, it will be well for the smaller cities along the shore of the lakes to watch the movements of their great rival and not let her get any undue advantage.

"It will be well for Cleveland engineers to work out the problem for themselves and not trust it entirely to those who represent Chicago interests. The equal possession of these great internal waterways is a fundamental right of all the cities and towns which have grown up upon their shores, or through dependence upon them as lines of traffic. The past history of the Great Lakes has been altogether providential and is therefore secure, but it is evident that their future history is to be more and more in the hands of man, where the principles of equity are not always observed.

"I may add that the most of the information concerning the glacial outlet at Chicago has been furnished me by Mr. Ossian Guthrie, one of the city engineers, who has been most active in promoting the proposed system of drainage and in noting the glacial phenomena of the region. I must also say that in the general preparation for this lecture I am largely indebted to Prof. E. W. Claypole, who read a most interesting and suggestive paper upon the subject several years ago before the American Association for the Advancement of Science."

FLOTSAM, JETSAM AND LAGAN.

Green Bay is frozen over from shore to shore and is about the only place where fishing through the ice can be carried on.

The invention of the naval torpedo called out the counter invention of the torpedo net. Now an Austrian has invented a pair of shears for cutting torpedo nets. The next thing will be a device for dulling the edge of these shears. The art of war is making great strides, but it is costly and superfluous as compared with peace, which is within the reach of all.—*Ex.*

Cases of leakage among vessels wintering grain and coal cargoes at Chicago are coming to light. A broken sea-cock let over two feet of water into the steamer Progress before the leak was discovered and it took a tug four hours to syphon the water out. The City of Berlin, coal laden, was found leaking so badly that it took a gang of men two days or more to free her with the deck pumps.

During 1893 the Middle Island life saving crew, of which Donald McKenzie is captain, rendered assistance to the following vessels in distress: Yacht Vera, of Detroit; tug Ralph with raft; steamer Wm. Edwards, of Huron, O.; schooner Ogarita, of Buffalo; tug E. C. Benham, of Cleveland, and schooner G. M. Neelon, of St. Catherines, Ont. The value of the above vessels and their cargoes was $135,000, and the number of lives on board 55.

At the life savers' banquet recently tendered by Mr. Churchill at Alpena, Mich., were six keepers whose terms in the service ranged from 12 to 17 years. They are as follows: Capt. Joseph Valentine of Hammond's Bay station 17 years, having entered the service in September 1876; Capt. Donald McKenzie, of Middle Island station, 17 years; Capt. John D. Persons of Thunder Bay station, 16 years; Capt. H. D. Ferris of Pt. Aux Barques station, 16 years; Capt. Henderson of Sturgeon Point station, 13 years; and Capt. George Plough, now of Sand Beach station, 12 years. Many of the surfmen too, now belonging to the active service at these stations, have served from ten to sixteen years.

Mariners, as a rule, have an idea that they cannot enter successfully into any other calling in life than that of seafaring after they have been employed in it for many years. This is a mistake. A case in point is that of Capt. Geo. S. Johnson, now master of the George W. Clyde, between this port and the West Indies. Capt. Johnson had some misunderstanding with the Commodore (?) of the Ward Line, by which company he was employed, and left the ship. Nothing offering in his line at the moment, a friend suggested that he canvass the shipping district of the city in the interest of a nautical book he was about to publish. The next day found Capt. Johnson along the docks with his subscription list, and a good paying business he made of it until he was offered a position in a Clyde Line steamer, where he has been for some time. A man doesn't know what he can do until he tries, and a thorough sailor is a handy man in almost any occupation. The preponderance of failures by old tars to make a living ashore is largely due to their lack of confidence in themselves. —*The Bos'n, in the New York Sunday Advertiser.*

THE SCHOONER.

Just mark that schooner westward far at sea,
'Tis but an hour ago
When she was lying hoggish at the quay,
And men ran to and fro
And tugged and stamped and shoved and pushed and swore,
And ever and anon, with crapulous glee,
Grinned homage to viragoes on the shore.

So to the jetty gradual she was hauled;
Then one the tiller took,
And chewed, and spat upon his hands, and bawled,
And one the canvas shook
Forth like a moldy bat; and one, with nods
And smiles, lay on the bowsprit end, and called
And cursed the harbor master by his gods.

And, rotten from the gunwale to the keel,
Rat-riddled, bilge-bestank,
Slime-slobbered, horrible, I saw her reel,
And drag her oozy flank,
And sprawl among the deft young waves that laughed
And leapt and turned in many a sportive wheel,
As she thumped onward with her lumbering draught.

And now, behold! a shadow of repose
Upon the line of gray
She sleeps—that transvers cuts the evening rose—
She sleeps and dreams away,
Soft-blended in a unity of rest,
All jars and strifes obscene and turbulent throes,
'Neath the broad benediction of the west.

Sleeps, and methinks changes as she sleeps
And dies in a spirit pure.
Lo, on her deck an angel pilot keeps
His lonely watch secure;
And at the entrance of heaven's dockyard waits,
Till from night's leash the fine breathed morning leaps,
And that strong hand within unbars the gates.

F. E. Brown, in London *Athenaeum.*

STATISTICS OF THE COMMERCE OF MILWAUKEE.

The report of the marine commerce of Milwaukee for the year 1893, as compiled by ex-harbor master James F. Troweli, is in substance as follows:

Vessel arrivals, 9,387; tonnage of same, 5,189,572; departures, 9,528; tonnage, 5,180,497; total arrivals and departures, 18,915, with an aggregate tonnage of 10,370,069 against 11,759, and tonnage of 8,022,330 for 1892.

Receipts of coal were: Anthracite, 754,241 tons, against 862,696 tons in 1892; bituminous, 369,104 tons, against 320.423 tons; total, 1,123,345 tons, against 1,183,119 tons last year.

Lumber receipts by lake from Jan. 1 to Dec. 16 were 167,360,000 feet; shingles, 17,125.000; lath, 1,280,000; posts, 281,000; ties, 57,091;. bark, 27,193 cords; wood, 76,397 cords; iron ore, 50,221 tons.

Salt receipts amounted to 559,905 barrels.

Vessels wintering here are classed as follows: Grain steamers, 23, the total tonnage being 33,832; grain barges, 11, tonnage, 6,758; lumber steamers, 16, tonnage 4,482; passenger steamers, 4, tonnage, 2,944; fire boats, 2, tonnage, 170; schooners, 50, tonnage, 7,590; harbor tugs, 10, tonnage, 285; fishing steamers, 10, tonnage, 141. Total steam tonnage, 41,633; sail, 14,348; total, 55,981.

Receipts of grain for the year were: Wheat, 12,401,-369 bushels; corn, 1,330.525 bushels; oats, 7,793,474 bushels; barley, 11,138,803 bushels; rye, 1,178,890 bushels; total, 33 843,01 bushels.

Shipments: Wheat, 2,026,701 bushels; corn, 28,660 bushels; oats, 4,782,182 bushels; barley, 4,646,834 bushels; rye, 488,326 bushels; total, 11,972,703 bushels.

Grain in elevators on Dec. 18: Wheat, 1,055,869 bushels; corn, 15,000 bushels; barley, 259,796 bushels; oats, 459,523 bushels; rye, 33,274 bushels: total, 1,823,462 bushels.

There are four lines of steamers in active commission during the winter, the F. & P. M. R. R. Line with four steamers; the D. G. H. & M. R. R. Line to Grand Haven with two steamers; the Vandalia Line, two steamers and the Goodrich Transportation Co., two steamers. These steamers run regularly throughout the winter months and they all carry full cargoes each way, besides having a large passenger list.

Dredging done during the year was as follows: In Milwaukee river, 71,149 cubic yards; Menomonee river, 53,869 9-10 cubic yards; Kinnickinnic river, 38,613 9-10 cubic yards; total, 163,632 8-10 cubic yards.

Compared with last year, the shipments of iron ore from Lake Superior mines by lake show a drop from 8,845,313 tons to 5,836,749 tons. In grain shipments, those made from Chicago amounted to 2,964,591 tons, including flour, against 3,024,813 tons for 1892.

Duluth gained in wheat shipments from 32,004,000 bushels in 1892 to 38,167,000 bushels for 1893. Shipments of flour from Duluth also jumped from 4,475,000 barrels to 6,129,000 barrels. Shipments of grain from the northwest indicate a flourishing industry.

Vessels totally lost in 1893. Under this head Capt. Trowell gives a complete list of the tonnage known to have gone out of existence, through stranding, sinking and destruction by fire, during the season just closed. He says: "The list of total losses published in many of the lake dailies during the first week in December emanated from the Lake Marine News Bureau, and was wholly unreliable, as it contained among its fifty-four names those of seven schooners and one steamer that are still in existence and likely to last a number of years longer; also four harbor tugs, which, with at least a dozen others that were destroyed by fire mainly and pronounced total losses, but will no doubt turn up again in as good condition as ever, are excluded from the list, as they cut no figure in the strictly commercial tonnage of the lakes. The names given below are those of fifteen steamers, three large lake tugs and thirty-six schooners—fifty-four in all—whose measurements aggregated 24,189 tons, and Lloyd's valuations reached $1,-029,100. The only one in doubt among them is the steel steamer Mascotte, which was recently burned in St. Clair river and reported a total loss. The list, which is worth preserving, is as follows:

NAMES—STEAMERS.	Ton'ge	Value.
F. W. Wheeler	1,175	$ 95,000
Waldo A. Avery	1,035	80,000
Dean Richmond	1,257	46,000
Wocoken	1,279	70,000
Albany	1,677	160,000
Philadelphia	1,230	80,000
Arctic	411	10,000
Lowell	255	15,000
S. C. Clark	270	15,000
Thomas H. Smith	198	18,000
Ida M. Torrent	251	23,000
Byron Trerice	200	15 000
Oneida	746	32,000
Mascotte	91	18,000
Lucile	146	8,000
TUGS.		
Acme	234	25,000
Sea Gull	342	30,000
O. Wilcox	114	10,000
SCHOONERS.		
Newell A. Eddy	1,207	65,000
Minnehaha	782	28,000
J. D. Sawyer	605	16.000
J. B. Merrill	609	20,000
Annie Sherwood	591	12,000
David Stewart	518	12,000
David Vance	736	25,000
Pelican	773	17,000
Michigan	1,227	30,000
R. B. Hayes	635	20,000
George	751	25,000
M. R. Warner	665	18,000
Riverside	264	5,000
C. B. Benson	283	6,500
Windsor	227	5,500
Evra Fuller	217	3,000
Annie Falconer	201	4,200
M. A. Muir	330	6,000
Corsican	210	3,000
H. J. Mills	483	18,000
M. L. Collins	219	3,000
William Wheeler	309	5,000
Adirondack	277	3,000
E. P. Royce	237	4,000
Vienna	166	4,800
R. J. Gibbs	168	2,000
Lumberman	152	3,000
Sam Bolton	314	3,000
America	258	3,000
Flora Emma	154	2,200
Hattie Earl	112	1,000
J. A. Travis	96	2,500
Sassacuss	103	1,500
Volunteer	50	1,000
Dreadnaught	50	400
Laurina	55	500
Total	24,189	$1,029,100

The following is a summary of vessels in winter quarters:

STEAMERS.	Tonnage		Tonnage
Fred Pabst	2,430	Manhattan	1,545
Ferd Schlesinger	2,607	Manchester	2,132
W. H. Wolf	2,265	Merrimac	1,398
Frank L. Vance	1,731	Minnesota	1,138
R. P. Flower	1,953	G. W. Roby	1,843
Denver	1,295	Roumania	1,837
Marion	1,206	Samoa	1,096
John Duncan	1,267	Lehigh	1,704
P. J. Ralph	964	George Smith	....
T. S. Christie	769	Tom Adams	....
Queen of the West	818	W. J. Carter	171
J. C. Pringle	474	Hilton	122
Maggie Duncan	535	Rand	147
St. Joseph	260	John Schroeder	372
New Era	220	J. M. Allmendinger	125
Roanoke	423	William Rudolph	209
Westover	455	Joys	222
George Burnham	218	G. C. Markham	249
Colin Campbell	280	Total tonnage	38,314
Maryland	2,419		
Massachusetts	1,415		
PASSENGER STEAMERS.			
Nebraska	1,483	Douglass	222
Revenue Str. Andrew Johnson	534	Total	2,944
City of Fremont	705		

FIRE BOATS.			
James Foley	85	Cataract	85
		Total	170
SCHOONERS.			
Morning Star	195	J. U. Porter	140
La Petite	203	E. Scoville	117
Ebenezer	119	Dan Maybee	184
John C. Bauer	181	Emma Banner	92
A. B. C. F. M.	136	Boaz	120
Fearless	156	Pride	112
Cuba	181	Quickstep	268
J. B. Prime	162	C. E. Wyman	223
Black Hawk	163	Elida	182
B. F. Wade	241	Conquest	143
Annie O. Hanson	176	Rob Roy	111
Maggie Thompson	147	Dan Hayes	138
Lavinda	119	Challenge	86
Mary Ludwig	65	Minnehaha	71
L. May Guthrie	137	L. A. Burton	204
Walhalla	109	Oneida	241
Starke	199	Emily and Eliza	60
Three Bells	241	Charles Luling	200
Mary A. Gregory	176	Arctic	176
Lucia A. Simpson	241	Annie Dall	161
Mary E. Cook	147	S. Thall	52
Alice M. Beers	146	C. Harrison	95
J. V. Jones	190	Penobscot	244
Z. G. Simmons	130	Augustus	52
Alice	60	Mattie C Bell	769
Metacomet	852	A. T. Bliss	437
Sweetheart	538	Sidney O. Neff	346
J. J. Barlum	1,184	City of Toledo	245
Amboy	893	Grace Grummond	205
James Mowatt	523		
Rosa Sonsmith	766	Total	14,348
Leo	95		
HARBOR TUGS.			
Calumet	31	Welcome	38
J. J. Hagerman	21	W. H. Simpson	27
Knight Templar	19	Carl	16
Milwaukee	26	John B. Merrill	15
S. S. Coe	15		
Starke	27	Total	235
FISHING STEAMERS.			
Arthur	18	Hannah Sullivan	14
A. Eaton	8	H. M. Van Ells	19
Dan Costello	13	Hoffmong	10
G. R. Green	12	L. A. Schultz	15
G. M. A. Herriman	17		
Henry Troy	15	Total	141
Total Steam Tonnage			41,633
Total Sail Tonnage			14,348
Total			55,981

SALE OF THE FAST YACHT CORONET.

The schooner yacht Coronet, which defeated the Dauntless in the famous ocean race across the Atlantic for $10,000 a side in 1887, has been sold by James D. Wing to A. C. James, and will shortly be fitted out for a cruise in the West Indies.

The Coronet, which was built for T. R. Bush, of Brooklyn, by C. and R Poillon, in 1885, from designs of Smith & Terry, is considered by many to be the fastest ocean-going yacht afloat, but it is not at all unlikely that the more modern Yampa could defeat her. Capt. C. S. Crosby, one of the best of our old-time skippers, who has been in charge of her from the time of her launching, still thinks she cannot be beat, and nothing would please him more than a mid-winter race across the Atlantic against either the Dauntless or Yampa.

After the Coronet was built, her owner, Mr. Bush, issued a challenge to race her across the Atlantic against anything afloat. His challenge was finally accepted by Commodore Caldwell A. Colt, the owner of the Dauntless, and the match was made for $10,000 a side. The start was made off Bay Ridge, March 12, 1887, and, as almost every one knows, the Coronet was successful, arriving at Queenstown, March 27, after a voyage of 14 days 23 hours 30 minutes and 46 seconds. The Dauntless finished in 16 days 1 hour 43 minutes and 13 seconds. After her victory her owner tried to dispose of her on the other side, but was unsuccessful, and the following year made a trip around the world in her, leaving New York on March 20 and arriving at Santiago on July 5. From here the Coronet went to Honolulu, thence to Yokohama, Amoor, Hong Kong, Singapore, Ceylon, Bombay, Aden, and through the Suez Canal to Malta, Algiers, Gibraltar, Madeira, and home via the Columbus route after a voyage of 13 months, which is probable the longest voyage ever taken by an American sailing yacht.

THE CRUST OF THE EARTH.

A theory has been put forth in the French Academy of Science that the crust of the earth beneath the continents does not touch the fluid globe, but is separated from it by a space filled with gaseous matter under pressure. The continents would therefore constitute a sort of blister, much flattened, inflated and sustained by gases, while the bottom of the oceans is supposed to rest directly on the fiery mass. By this hypothesis the author believes that many phenomena of the terrestrial crust may be explained which are not clearly accounted for under the present theory.

THE METEOROLOGY OF THE PACIFIC OCEAN.

The U. S. Hyhrographic Office is collecting information concerning the meteorology of the Pacific, to the end that reliable information concerning its prevailing winds, storms, currents, and similar characteristics may be collated and published for the benefit of all mariners. Blank forms for recording simultaneous observations of winds, temperatures, heights of barometers, and kindred data are prepared and issued by the Hydrographic Office to all persons willing to keep them. Masters of all vessels trading in the Pacific are earnestly requested to supply themselves with these blanks, take the required observations, and forward the filled sheets to any of the Branch Hydrographic Offices or the main office in Washington, to be utilized in the above mentioned publications. These blanks may be obtained upon application to the Main Office orto any of the Branch Offices, and full information concerning the taking and recording of the observations will be furnished. Due credit will be accorded to all persons making reports.

PARTICULAR OR GENERAL AVERAGE.

Some pretty lively evidence is promised when the case of the Flint & Pere Parquette Railway Co., against the North American of Philadelphia, the Sun, London Assurance, Reliable Marine and Marine Insurance Co., of London comes up for trial. The companies named held risks upon the cargo of the steamer F. & P. M. No. 2 when she stranded six miles west of Long point light, Lake Erie, November 19, 1892. The cargo was a total loss, but the steamer was released and repaired at a heavy expense. Had the steamer shared the fate of the cargo the loss would have been an ordinary total loss, in which the underwriters on hull and cargo would have clearly been called upon to pay the amount of their respective risks. But the release of the steamer constituted a contributory one, in which the cargo is required to bear a share of the wrecking and repair expenses proportionate to its value. The amount for this reason assessed against the companies named, which they repudiate and to recover which suit has been instituted, is about $13,000.

The case appears to hinge upon a single point. In his protest Capt. Tierney, who commanded the F. & P. M. No. 2. states that after the steamer grounded and when he became satisfied that she could not work herself into deep water again he had her scuttled by opening the seacocks. This is denied by the underwriters interested, who claimed that the steamer filled through the strain which resulted from pounding heavily upon the bottom and they will endeavor to prove that such was really the case. The point to be shown in order to avoid contributory liability is that the cargo was not ruined in an effort to save the steamer that there was no voluntary and successful sacrifice of a portion to save the remainder. To attain this the correctness of the protest must be clearly impeached and a different complexion put upon the ultimate loss, rendering liable ship, freight and cargo in due proportion to the losses incurred.

IRON ORE FIGURES.

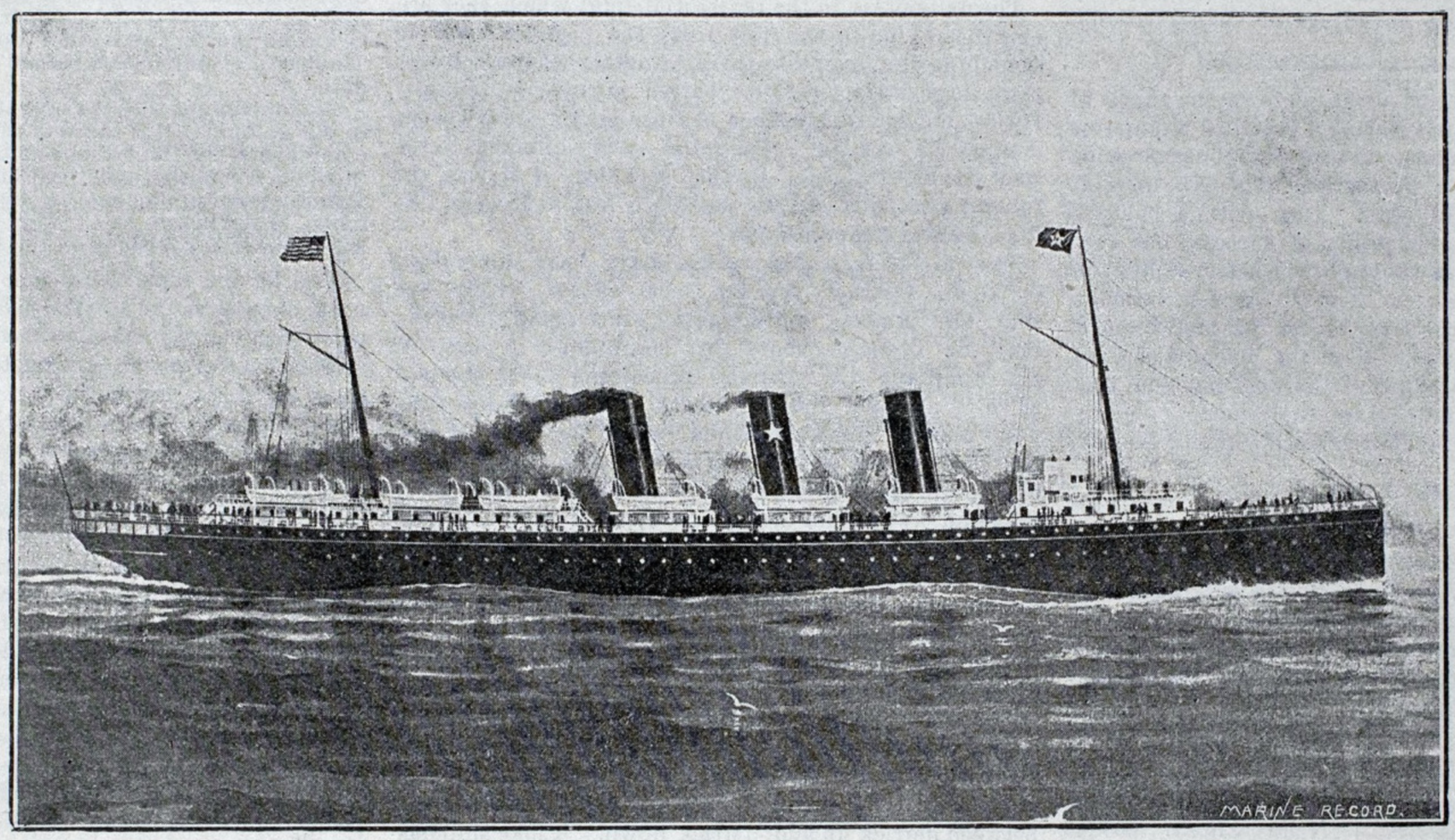
The iron industry of the country may be summarized by states as follows: Twenty-five states of this Union yield 15,000,000 tons of iron ore, the value of which is about $37,500,000. The value of the pig iron produced in this country from this ore is $132,000,000. The value of iron ore by states in 1889 was as follows: Alabama, $1,457,314; Colorado, $469,546; Connecticut, Maine and Massachusetts, $278,888; Delaware and Maryland, $54,469; Georgia and North Carolina, $317,372; Idaho and Montana, 140,647; Kentucky, $133,885; Michigan, $15,588,369; Minnesota, $2,464,419; Missouri, $470,457; New Jersey, $1,352,509; New Mexico and Utah, $69,956; New York, $3,028,676; Ohio, $515,148; Oregon and Washington, $40,389; Pennsylvania, $3,045,100; Tennessee, $629,454; Texas, $16,129; Virginia and West Virginia, $891,346; Wisconsin, $1,798,627. It will be seen that Michigan leads all of the other states in the output of ore. Pennsylvania is next in order, Alabama is third and New York is fourth. In 1891, Michigan produced 6,127,001 tons of red and brown hematite and magnetic ore; Alabama gave 1,986,830 tons of hematites; Pennsyivania mined 1,272,828 and New York 1,017,216 tons. The output of these four states was therefore, 10,403,975 tons and that of the remaining 21 of the iron-producing states was 3,978,203 tons. The total production in 1891 was, therefore, 14,591,178 tons. In 1880 the total production in the United States was 7,120,302 tons, and in 1870 it was 3,031,891 tons."

LAUNCH OF THE STEAMER NORTHWEST.

ILLUSTRATED.

The steel steamer Northwest, the largest and certainly the finest built and equipped vessel that ever floated on fresh water in the United States, built for the Great Northern Line, was successfully launched from the shipyard of the Globe Iron Works Co., Cleveland, O., on Saturday, at 2:30 o'clock, in the presence of a vast crowd of spectators. Nearly every lake port between Buffalo and Duluth was represented by delegations of vesselmen. A number of Atlantic coast shipbuilders were also present.

Miss Gertrude Hanna, daughter of president H. M. Hanna, of the Globe Company, cut the rope, the parting of which set the boat in motion on the ways, and as the hull moved towards the water, Mrs. F. P. Gorden bathed the vessel's bow in the contents of a quart bottle of champagne and christened the big craft Northwest.



TWIN SCREW PASSENGER STEAMER "NORTHWEST."

Her general dimensions are as follows: Length over all, 383 feet; length between perpendiculars, 360 feet; breadth, molded, 44 feet; depth, molded, 26 feet; depth to spar deck, 34 feet 5 inches.

The vessel has been built of mild steel throughout, with an inner bottom extending from the collision bulkhead forward to the afterpeak bulkhead aft. She has been built under special survey in order to obtain the highest classification in the United States Standard Register of Shipping. The hull has been specially strengthened and sub-divided through transverse and longitudinal bulkheads into numerous water-tight compartments. The construction throughout has been planned and carried out with the view of making the vessel not only the most modern and luxurious, but also the strongest and safest on the Great Lakes.

She is fitted with two vertical quadruple expansion engines of 3,500 horse-power each. The engines, when turning 120 revolutions per minute, will indicate 3,500 horse-power each, and with a total horse-power of 7,000 the vessel is expected to make an average speed of over twenty statute miles per hour. The propeller wheels are four-bladed, sectional, thirteen feet in diameter and eighteen feet pitch. The vessel cost about $600,000.

RESTRICTING ENTRY OF LABOR.

At the meeting of the Central Labor union, a bill prepared by the Central Labor union of Buffalo entitled, "An act for the necessary and better protection of American labor and the enforcement of the law of domicile and the restriction of immigration," was indorsed. The bill provides that it shall be unlawful for people to enter this country from Mexico or Canada to labor by any other places except those known as the United States ports of entry. It also provides that sailors and deckhands working on American vessels plying on our Great Lakes shall be permanently domiciled in the United States six months prior to their engagement on these vessels.

LITERARY NOTES.

The series of articles on "Great American Industries," edited by Mr. R. R. Bowker, will be resumed in the February *Harper's Magazine*, the subject treated being "A Bar of Iron." The article is a history of the processes of separating iron from its ores down to a description of the latest methods, including the Edison magnetic process. The story is popularly told, with effeetive pictorial illustrstions.

Proceedings of the Division of Marine and Naval Engineering and Naval Architecture of the International Engineering Congress held in Chicago July 31-August 5th, 1893. Edited under the supervision of George W. Melville, engineer-in-chief, U. S. N., by Walter M. McFarland, passed assistant engineer, U. S. N. 8vo. 1200 pages, $10 net. New York: John Wiley & Sons. These proceeding will be found to embrace a large collection of matter of the greatest interest to engineers. Previous to the meeting of the congress many papers were sent to prominent engineers in Europe and American inviting oral and written discussions. The written discussions received in answer to these requests and the oral ones participated in by eminent authorities at the congress and reported by stenographers, together with the reply of the author, follow most of the papers and make a complete compendium of present practice. Every paper has had the supervision of the Engineer-in-Chief of the United States Navy, Geo. W. Melville, and the proof in most instances has been read by the author. Among the papers which will prove interesting to our readers may be mentioned: "Lubrication," by Chas. M. Everest, vice-president of the Vacuum Oil Co.; 'The Use of Oil at Sea," by W. J. Millar, Secretary Institution of Engineers and Shipbuilders in Scotland; "The Use of Liquid Fuel on the Vessels of the Italian Navy," by Colonel Nabor Soliani, Corpo del Genio Navale, Italian Navy, government inspection of Merchay; "Naval Architecture in the United States," by Benjamin Martel; "Government Inspection of Merchant Vessels," by E. Platt Stratton; "Steamers of the Great Lakes Compared as Regards Strength, by J. R. Oldham; "Steam Shipping of the Great Lakes," by Walter Miller, of the Globe Iron Works Co., etc.

THE STEAMER DOUGLAS SOLD.

The propeller Douglas, valued at about $15,000, and owned by the McElroy Transportation Co., was sold at Milwaukee this week by United States marshal to the Wells, Brigham & Upham Co. for $3,425.

The boat was first libeled on a claim of Fred Zieglan, the engineer, for wages, but a few days after the claim was allowed other claims were filed against her and still others are expected to come in, tne court having allowed twenty days after the date of the sale for the filing of claims.

The sale took place on board the Douglas in the presence of a large number of shipowners and masters. The first bid made was $1,000, and even some difficulty was found in securing an increase of this figure. It required over an hour's work to bring the amount up to the figure of the sale.

The Douglas is one of the handiest little boats out of Milwaukee and was on the route between that city and Michigan ports exclusively. Last year, on June 12, she occasioned a loss of $6,500 to her owners by colliding with and sinking the A. E. Wilds.

The Marine Record,

ESTABLISHED 1878.

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CLEVELAND, O., JANUARY 11, 1894.

LAST season may easily be branded as a killjoy in marine transportation circles, notwithstanding it opened out so auspiciously. The coming season holds out but little hopes to the vessel owner that it will be a lucrative one, yet who knows? If the business is to be guaged by the rule of contrary, as it certainly was last year, then 1894 may close in as satisfactory a manner to lake carriers as the past season has been the reverse. The situation is mainly in the hands of vessel owners, and they should take every proper advantage of their surroundings.

THE success which seems about to crown the efforts of the Navy Department in securing a practical submarine torpedo boat has set a host of inventors busy devising schemes for submarine navigation. The *Engineering and Railroad Journal* says: "One—with a boldness deserving of a nearer probability of success—has even gone so far as to propose a submarine electric trolley line for transcontinental service. Thus in one fell swoop he breaks the record of the time of the passage, removes horrors or seasickness and realizes the machine of Capt. Nemo. Of course, the details of the work have not been developed, but a new daily gives the scheme publicity and the mere matter of detail is a trifle beside the conception."

LIQUID FUEL FOR TUGS.

From an account recently published relating to the statistics of inland navigation in Russia, we are led to remark on the increasing use of petroleum fuel, in place of wood or coal, for generating steam in the boilers of their tug boats. The different fuels used and their respective quantities are as follows:

	1884.	1886.	1890.
Wood, cords	742,121	801,020	598,897
Coal, tons	158,136	182,881	279,680
Petroleum residue, tons	214,995	276,237	568,143
Total horse power	72,105	84,404	103,177

A cord of wood averages about two tons.

It is evident, therefore, that with an increase of over 40 per cent. in the total horse power from 1884 to 1890, the decrease in the consumption of wood has been 10 per cent., and in the case of coal 70 per cent. On the other hand, there is the great increase of over 160 per cent. in the use of petroleum. In this relation absolute weight is not of the same importance as absolute bulk, and in this respect the proportion between petroleum and wood is as one to six. It may also be observed that a tug boat can usually take on board a quantity of wood sufficient to last for two or three days and that from six to ten hours are required to load it. The same vessel can in a very limited time, say four hours, "coal" herself with petroleum fuel sufficient to last her for eight to ten days.

Another feature of importance in favor of this fuel is that there is no stoking required, the fire being once lit all that remains to be done is to regulate the supply of oil to the furnace, which in most cases can easily be attended to by the engineer, thus reducing the number of hands required and getting rid of what is usually a very hot and laborious occupation, that of stoking; also doing away with the necessity of frequent opening of the furnace door and the consequent inrush of cold air, which helps considerably toward shortening the life of a boiler.

The United States, as is well known, possesses immense resources in mineral oils, and a great number of large tank steamers are engaged in the transport of it from this country. Its use as a fuel has hitherto been confined to launches and pleasure boats, but we expect the day is not far distant when we will see some enterprising tug owner on the lakes strike out in this direction, to be followed up soon after by a larger class of vessels, carrying it as permanent fuel for ballast in their water bottoms.

COMPASS DEVIATION IN METAL STEAMERS.

It is an open question whether sufficient attention is paid on the lakes to the subject of compass deviation in metal steamers. The trade is, of course, short, and as the land is frequently sighted, new departures may be taken and courses altered at convenience. There are, no doubt, masters now in command of metal steamers who stand ready to ridicule the distinctively separate terms known as variation, deviation, local attraction and heeling error. This class of men note closely the landfalls made in the early part of the season and by guessing a change of course make a better landfall the next time they are on that track. Hence, the compass regulates the course to be steered and not the master.

It may be confidently stated that there is not a metal vessel afloat on the lakes, or elsewhere, whose compasses are clear of the error (if such it may be called) of deviation on all headings, yet the fact remains that few, if any, iron, steel or composite steamers are equipped with deviation diagrams to show the error which it is necessary to allow for when shaping a course or taking a bearing; in fact, if a bundle of such were aboard few masters would keep them posted up, consequently deviation as an applied correction on a compass, magnetic or true course, is allowed to go by default. So also in many cases is the variation for the locality entirely neglected, and yet, an immence commerce is successfully carried on, and this too with only an occasional stranding in thick weather. The causes of these strandings have never been inquired into, and therefore the fraternity lacks the information which might, in the event of a clear statement of the course steered being placed in evidence, prove the existence of currents or compass deviations.

The daily press, in the repertorial light which they are able to shed on this subject, treat the positive error in something of a strain like this: "Another whopper, funny yarn—local attraction Jack barred out in story telling—$20,000 damage to a steamer because the innocent wheelsman wore a cork leg." The mind is not directed to the steel bands, stays, etc., on the cork leg; if it was, the funny part would collapse—be totally lost, as it were, like the steamers sometimes are.

The incidents where vessels have been imperilled in thick weather through local causes within the ship are almost innumerable. Much good, however, may be brought about by mentioning a few of the simplest. A steamer proceeding in a comparatively narrow channel steering a well tried compass course, suddenly found herself beached; cause: the owner with a silk umbrella in his hand standing beside the master near to the compass. Now carry the mind away from the silk covering of the "rain protector" and note the numerous vertical bars forming the frame of the umbrella. The cause of the total loss of a fine steamer after she fetched up on the coast was traced to the man at the wheel wearing an electric belt. The swinging of the port quarter boat inboard when going along the land in a fog almost caused the stranding of a large Cunard passenger steamer, and this case applies to the cat and fish davit usually carried on lake steamers. Relative to cargo derricks placed on the masts, 18°, or a point and a half, was the difference noted in the compass between derrick up and derrick down. A lake shipmaster, finding his compass working somewhat eccentric, is credited with discovering that the corsets of two lady passengers seated in the pilot-house had become magnetized through their inquisitive attempts to learn all about the dynamo in the engine room. Again have we to get our mind away from this article of dress as it appears externally and take into consideration the light steel ribs used to keep it in form (we suppose). Every shipmaster can no doubt quote instances where a local and easily removed object had affected the working of his or some other man's compass after the manner of local attraction. Deviation, however, is caused by the iron entering into the construction and equipment of the vessel, and is subject to frequent though not erratic changes. Unlike variation, it changes with a change of tne ship's head, even although she was hung in the center while swinging, or moored "all fours" and then gradually swung. Evan's Manual asserts that magnetism exerts its influence through all bodies, even the most dense, and the master who considered that half a cargo of railroad iron offered no attraction to his compasses when buried under a couple of thousand tons of coal, lost his vessel in the Gulf of St. Lawrence owing to his belief in this palpably erroneous feature.

While on this subject it might be well to point out the simplicity of azimuths in determining the corrections to be applied to courses from bearings taken of the sun: Sun's true bearing, S. 57° W.; sun's compass bearing, S. 84° W.; correction or total error, 27° W.; variation as per chart, 22° W.; deviation, 5° W.

Another form, which, however, contains the same number of figures, is as follows: Sun's true bearing, S. 57° W.; variation as per chart, 22° W.; sun's correct magnetic bearings, S. 79° W.; sun's compass bearing, S. 84° W.; deviation, 5° W.

Amplitudes taken at sunrise and sunset are reliable and a standard problem, while the number of true bearings which may be secured from well known points of land leaves nothing further to be desired in facilitating the taking of observations to learn the angles of deviation on all courses. Such being the facts, it behooves men in charge of metal vessels to watch closely the changes in the deviation of their compasses throughout the season of navigation, for the vessel will seldom or never have the same errors in the spring that she was laid up with the previous fall, nor can an early adjustment obviate this seeming discrepancy.

CROSS WHISTLES AGAIN.

The investigation into the facts attending the collision between the steamers Arthur Orr and Thomas H. Smith off Racine North point in November last has been concluded by the local inspectors of steam vessels, William Fitzgerald and Daniel W. Chipman, of Milwaukee, and their finding, according to the official report of the inspectors made to Supervising Inspector C. H. Westcott, under date of Dec. 30, is as follows:

"We her-by report the conclusion of an investigation held to inquire into the cause of a collision between the steamers Arthur Orr and Thomas H. Smith on Nov. 11, 1893, at 3 a. m., near Racine North point, in a dense fog, which resulted in the sinking within an hour of the Thomas H. Smith. The testimony in this case is so conflicting that we are unable to decide which steamer was in the fault, but the evidence sustains us in our conclusions that rules 3 and 4 of the pilot rules for lakes and seaboard have been violated by the officers of the above steamers, they having given cross passing signals and other than fog signals in a dense fog instead of complying with said rules 3 and 4. For the above violations we have suspended the master and pilot licenses of C. J. Montague, master of the steamer Arthur Orr, and Thomas O. Olson, master, and John Colwell, mate, of steamer Thomas H. Smith, for a period of sixty days from this date.

"In concluding this investigation we are strengthened in our opinion that if masters and pilots would more fully comprehend the importance of the able and clear manner in which the meaning of rule 3 is explained by the supervising inspector general in department circular No. 10, dated Washington, D. C., Feb. 25, 1890, there would be less steamboat collisions on the lakes."

Now let the supervising inspector general of steamboats circularize the service, giving instructions that the most rigid examination on the "rules of the road" will hereafter be given all candidates that come before the local boards for original and raised licenses, so that the order attached to the verdict of the Milwaukee inspectors may be of future benefit.

The comment of the local board appears to reveal incompetency relative to a knowledge of fog signals. This impression they no doubt gained through evidence submitted during the investigation of the steamboats' officers and crews, but, is this not casting a reflection on the inspectors or local board that granted the original licenses? Do not masters and pilots fully comprehend the fog signal rules? And if not, whyfore should they be granted certificates? It is no secret that local inspectors at lake ports have given certificates of competency to men who could not "box the compass" or recourt the marks and deeps on a hand lead line if their lives depended on it. Such men as the foregoing being turned loose on the lakes annoy competent seamen and not infrequently place lives and property in jeopardy. For this reason, the careless and ignorant inspectors issuing certificates to such characters ought to be impeached and instantly dismissed from the service in spite of all "political pulls," which they might bring to bear toward retaining their situation.

To arrive at immediate results, again let the supervising inspector general, as head of the service, appoint a committee of his supervisors to investigate all licenses cancelled on the grounds of incompetency during the last few years—determine the degree of culpability of the inspectors who issued the original licenses, and if warranted, as no doubt it would be in many cases, unship the local inspector in such a hurry as to make his head swim. Such a proceeding would be just and equitable to all concerned, and a method which is now expected from the service.

To come back to the point of our caption, the local inspectors state: "We are unable to decide which steamer was in the fault." Well! they coralled the culprit by mulcting both, which, we opine, was a first-rate way out of the dilemma, especially as their verdict of sixty days' suspension of license means nothing. The early opening of navigation will see each officer again in full possession of his papers, though no more experience or knowledge can be gained while navigation is shut down, hence, they start in afresh on the same technical basis of information that they had aboard when their licenses were temporarily revoked.

It is to be regretted that such a weak phrase as "We are unable to decide which steamer was in the fault" should have entered into the findings of the local inspectors. There ought to have been more backbone to their verdict, and in the case of one of the masters, who, we may

say, is considered one of the most competent on the lakes, the impeachment will not rest easy in view of such loose language being used in the finding of the court, and the belief is prevalent, that if he erred, a considerable number of others are also prone to make similar departures.

THE Inland Lloyds vessel register has about run its race, that is, if actual indications count for anything. With no talent to survey, or form rules of classification for the construction of iron, steel and composite built vessels it was simply a question of time how long such a register could survive in the era of modern built craft. There has not been wanting those who claimed that even the wooden ship rules of Inland Lloyds in class and valuation, were entirely too elastic to be equitable. While metal vessels were absolutely beyond their knowledge to class. A classification society has no right or reason to place arbitrary valuations on tonnage, or to work hand and glove with underwriters, builders and owners in the class rating and valuation which shall be given a vessel. The more untrammeled and disinterested a surveyor's report is, the more likely is it to subserve the ends of justice to all concerned. Let proper rules, suitable for the trade, be formed, then vessels built according to specifications will receive their full credit for the class they are in, according to the adopted code of the classification societies whose business it is to rate them, high and flattering in one, perhaps, and only medium in another.

ACCORDING to the principles recently enunciated by the supervising inspector general of steamboats, politics, especially in the subordinate capacity of assistant inspectorships, was to "cut no figure." However, a Republican assistant inspector of hulls was given his conge this week in rather a peremptory manner, that is to say, he received but a few days' notice to vacate his position on the excuse that the department desired to practice entrenchment and economy. A considerable number of vesselmen feel curious to learn the political affiliation and date of induction into office of the successor to the late assistant, who, by the way, was one of the most technically competent officers in the service.

GRAIN SUPPLY.

The stock of grain in Chicago elevators and afloat last Saturday evening were 20,739,000 bushels of wheat, 3,643,000 bushels of corn, 668,000 bushels of oats, 238,000 bushels of rye, and 132,000 bushels of barley. Total, 25 420,000 bushels of all kinds of grain, against 23,187,000 bushels a year ago. For the same date the secretary of the Chicago Board of Trade states the visible supply of grain in the United States and Canada as 79,953,000 bushels of wheat, 9,526,000 bushels of corn, 3,807,000 bushels of oats, 572,000 bushels of rye, and 2,158,000 bushels of barley. These figures are smaller than the corresponding ones a week ago by 275,000 in wheat and larger by 1,204,000 in corn. The visible supply of wheat for the corresponding week a year ago increased 548,000 bushels.

BUFFALO YACHT CLUB ELECTION.

The annual election of the Buffalo Yacht Club will be held this week, when the election of officers for the current year will take place. The following names have been placed in nomination: For commodore, Frank B. Hower; vice commodore, Henry M. Birge; secretary, Howard A. Baker; treasurer, W. C. Cowles; fleet surgeons, Herbet Mickle, M. D., and E. P. Hussey, M. D. The foregoing names are on both tickets, but for the other officers there are distinct sets of nominations. They are: Directors, first ticket, H. M. Birge, H. D. Williams, F. L. Bennet, J. S. Thompson, L. G. Northrup and C. A. De Laney; second ticket, F. L. Bennet, J. S. Thompson, L. G. Northrup, H. D. Williams, D. E. Morgan and W. H. Heath; regatta commttee, H. D. Pulsifer, George H. Chisholm and J. L. Daniel; E. P. Sears, J. W. Prouse and C. Lee Abell.

A number of important amendments will be made to the constitution at the meeting, also.

REVENUE SERVICE STEAMER BUILDING AT DUBUQUE, IOWA.

The steamer William Windom, for the revenue service, is now under construction at Dubuque, Iowa. Her dimensions are 170 feet 8 inches over all, 160 feet on the water line, 27 feet beam, 13 feet 5 inches depth of hold, 6 feet 5 inches draught, with a displacement of 412 tons.

Her machinery equipment consists of twin screws driven by a pair of vertical, inverted, direct acting, triple expansion engines with the high pressure cylinders placed forward. The cylinders are 11¾, 16½ and 26½ inches diameter with a stroke of 24 inches. The valve gear is of the Stephenson type with double bar links, and so adjusted that the main cut-off in full gear for both ends of the stroke is about 0.7 stroke. Piston valves are used for the high pressure and intermediate cylinders and slide valves for the low pressure cylinders.

The main condenser is cylindrical 3 feet 6 inches diameter with 1590 tinned tubes ⅝ inch outside diameter and 5 feet 1½ inches long, giving 1,333 square feet of cooling surface. The air and circulating pumps are combined and are independent of the main engines. The thrust shafts are 6¼ inches diameter with 8 collars 1¼ inches thick, 2 inches apart and 9¼ inches diameter. At 175 revolutions per minute the engines will develop about 800 horse power. Steam is supplied by a Scotch type boiler and an auxiliary Towne boiler; the former is double ended, 12 feet 2 inches diameter, 16 feet 4 inches long, with a 1¾ inch shell. It has 76 square feet of grate surface, 2,415 square feet of heating surface and will carry a working pressure of 160 pounds of steam. The Towne boiler has an 18 inches upper drum and two lower drums, all 4 feet 8 inches long, inclosed by bulging water legs connected by transverse tubes—forming an X—below the main drum. It has 9½ square feet of grate surface and 260 feet of heating surface.

DRY DOCK ASSOCIATION.

The annual meeting of the Dry Dock Association of the lakes, of which H. J. Mills, of this city, is secretary, will be held in Milwaukee next Wednesday.

GREAT SAILING.

The iceboat regatta on Lake Mendota, near Madison, Wis., on Saturday afternoon was the largest ever held. Thirty-eight boats took part. A twelve-mile course was sailed, and the best time was made by the J. B. Kerr and H. L. Moseley boats, 32.51, the William Bernard boat coming in 39 seconds later. Including tacking the course was over twenty miles long. The boats ran at times more than sixty miles an hour. It was a magnificent, exciting and picturesque race. Twelve small money prizes were awarded.

OFFICERS OF M. E. B. A., NO. 73.

The following is a list of newly elected officers, trustees and committe of M. E. B. A., No. 73, of Green Bay, Wis. H. R. Thrall, past president; E. B. Kellogg, president; James Lucas, vice president; H. C. Wheelock, treasurer and recording secretary; Paul Dennis, financial secretary; E. D. Rasmussen, corresponding secretary; Joseph Ritchie, conductor; B. M. Marx, door keeper; James Dunlap, chaplain; E. B. Kellogg, James Lucas, Henry Rasmussen, trustees; H. R. Thrall, Paul Dennis, E. D. Rasmussen, examining committee.

DR. LUCIUS A. SMITH.

Dr. Lucius A. Smith, well known as a naval architect of rare ability, and for a number of years prominently connected with the Continental Iron Works, of Brooklyn, N. Y., died of pneumonia at his residence in that city, on the 5th inst.

He was born in 1831, and graduated from Yale college in 1853, with the degree of Doctor of Medicine. Throughout his life Dr. Smith had found great pleasure in the study of marine architecture, and during the war in 1863 relinquished all intentions of following the practice of medicine and devoted himself entirely to the study of naval architecture and engineering. He became associated with the Continental Iron Works, retaining his connection with that prominent concern up to the time of his death. He was in charge of the designing and construction of vessels, and was known as a naval architect of great judgment and ability. Dr. Smith was a member of several engineering societies, and in his character as a man was universally loved and respected.

THR FOSTER COMPANY PROSPECTUS.

Foster Engineering Co. (Pressure Regulators for Steam, Water, Gas and Air,) Newark, N. J., state relative to the past years business as follows:

Our prosperity has been largely due to the awakened activity in shipbuilding generally, and to the large demand for our valves from the leading railroads of the country. This has kept the marine and railroad branches of our business on the jump. The patriotic purpose of our Government to build a new navy, resulting in the construction of such vessels as the peerless "New York" and "Columbia," and all the other cruisers and battleships lately built, has brought grist to our mill. All these Government vessels have been fully fitted out with our regulators. In fact, the Foster pressure regulator is the standard of the U. S. Navy. You will readily understand that on ship-board it is absolutely essential that not a pound of steam be wasted, but all that can be spared from the service of the many auxiliary engines should be utilized for the purpose of speed. This requirement the "Foster" valve meets to perfection, and it is not too much to say that the phenomenal speed which has made our cruisers the record makers and breakers of the world, has largely been attained, amongst other things, through the perfect operation of our valves. The same is true on all steamers though to a less exacting degree than in the Government service. Our valve is in use on thousands of ocean, sound and lake steamers, as well as on tugs, yachts, and ferry-boats, river, passenger and freight vessels, and in the coastwise traffic.

SHUFFLED OFF THE COIL.

Daniel McRae, engineer on the Straits of Mackinac transfer steamer St. Ignace, shot himself dead last Sunday night. The boat had almost reached Mackinaw City when Mr. McRae left the engine-room and joined his wife and family, who had been living on board for some time. He immediately locked the door, and, throwing the key outside, seized his rifle, placed it against his left breast and fired. His body was taken to Mackinac City, where an inquest was held.

MARITIME LAW.

PENNEFEATHER et al. v. BALTIMORE STEAM-PACKET CO.

Circuit Court, D. Maryland.

1. EQUITY JURISDICTION—MULTIPLICITY OF SUITS—COMPLICATED APPORTIONMENT. Where a carrier secures insurance on goods belonging to numerous owners, for their benefit as well as its own, and, the goods being destroyed, collects the entire amount of the insurance, equity has jurisdiction, on the ground of avoiding a multiplicity of suits and the difficulty of making a proper apportionment, of a suit brought by some of the owners, for the benefit of all who might join with them, to recover their alleged proportional interests therein.

2. INSURANCE—COMMON CARRIERS AND SHIPPERS—PLEADING. Where a carrier voluntarily, and primarily for its own benefit, insures goods received for transportation, but under policies purporting to insure "each and all owners of such good," such owners may maintain a bill against it to recover insurance money, averring that they were assured that the goods were destroyed and that the carrier collected the entire amount of insurance.

3. SAME. Where, however, the policies provide that no owner of goods, who has insured for himself, shall be entitled thereunder, except to the excess of his loss, a bill is demurrable which fails to state whether there was such other insurance, and its amount, if any; for if the carrier collected insurance on complainant's goods in excess of its own loss, and to which neither it nor complainant was entitled under the policy, this could give rise to no equities in favor of complainant.

SCULLY v. NEW JERSEY LIGHTERAGE CO.

Circuit Court of Appeals, Second Circuit. October 17, 1893.

1. ADMIRALTY APPEALS—SUPREME COURT—CIRCUIT COURT OF APPEALS. An expression of opinion on the merits by the Supreme Court in reversing and remanding an admiralty case, which was again tried in the Circuit Court after the passage of the judiciary act of March 3, 1891, is not binding on the Circuit Court of Appeals when, according to its practice, the case is brought before it on all the evidence, which shows an additional material fact not in the record before the Supreme Court, and the absence of which that court expressly recognized.

2. COLLISION—DAMAGE TO TOW. A vessel guilty of fault contributing to a collision with a tow, which is free of fault, is liable therefor, although the tug in charge of the tow was also in fault, and is not a party to the suit.

3. SAME—INSPECTION RULES—NEW YORK HARBOR. A tug rounding the Battery in New York harbor from the North river into the East river with a tow is subject to rule 2 of the supervising inspectors, providing that, when vessels approach each other obliquely, the one having the other on her starboard hand and being herself on the other's port hand, shall put her helm to port and pass under the other's stern; and she is not excused from obedience thereto by the fact that, as the other vessel is approaching obliquely across the East river, the manoeuver will throw her out into the ebb tide, and cause her great inconvenience and delay. 49 Fed. Rep. 92, affirmed.

4. SAME—CUSTOM. The mere fact that vessels in rounding the Battery often agree with each other to depart from the inspector's rule, so as to allow the vessel going against the tide to keep next the piers, is not sufficient to excuse a vessel for disregarding the rule without any agreement.

The opinion of the Supreme Court discussed the question solely from the point of view of a vessel obliged to fulfill the requirements of the nineteenth rule of section 4233 (the starboard-hand rule), which directed her to keep out of the way, but yet left her the choice of thus keeping out of the way either by porting or starboarding, although ordinarily that duty of avoidance is performed by porting and passing under the stern of the other vessel. The utmost that is held by the Supreme Court in this case is that upon the facts before it there might be found sufficient excuse for the Packer's undertaking to perform that duty by crossing the bows of the approaching vessel. But one most important fact was not before that court. By reason of the circum-

stance that the record contained no proof of the rules of the supervising inspectors, it was constrained to ignore the fact that, besides the considerations of light and weather, courses, bearing, speed and distances, there was another element of the situation, essential to a correct decision, to be taken into account by the master of the Packer, namely, that he was navigating in waters where a local rule directed his choice of manoeuvers, and advised the approaching vessel what that choice would be. If an effort by starboarding to cross the bows of an approaching vessel would have been "attended with great danger" if attempted at night or in thick weather, it would seem to be equally dangerous when attempted in the light of a controlling rule of navigation which clearly advised such approaching vessel that such effort was precisely the one thing which would not be attempted, and directed that vessel not only to keep her course, but even to assist a diametrically opposite manoeuver by herself porting. That the supervising inspectors have made rules applying to navigation in the waters where these vessels were is now proved. That one of those rules covers the situation in which they found themselves at sighting is plain. Their authority to make such rules was not disputed on the argument; nor on the point involved here is there any apparent inconsistency between them and the rules of section 4233. The rules prescribed by authority, so far as they apply, constitute the law by which courts must test the navigation of vessels when brought in question before them. One of the witnesses, an experienced tugboat pilot, ingenuously remarked that "the law is against our rules of navigation around here;" that "there is no law in this world ever can be made, in my opinion, to regulate the towing or sailing around the harbor of New York;" and that "the law, as I understand it, is made by men that don't understand it." All this may or may not be so, but a rule regulating the movement of a boat situated as the Packer was has been made, and violation of such rule is a fault, unless the vessel violating it can show some excuse, such as the twenty-fourth rule of section 4233 contemplates, for her disobedience.

The Supreme Court held that it was "by no means clear that the circumstances of this case would not bring it within the exception contained in the twenty-fourth rule of 'Special Circumstances,' requiring a departure from the general regulations." But mere inconvenience will not excuse her departure from the rules. Such departure must be "necessary to avoid immediate danger". Rule 24. It may have been proper for the Packer to suggest to the Wolverton, as she did by her two-whistle signal, that they should agree to courses, which would enable them to pass each other otherwise than as rule 2 required, thereby making her own navigation easier, and not seriously inconveniencing the Wolverton—a manoeuver which, if co-operated in by the Wolverton, would seemingly have been free from any risk of collision; but she had no right to depart from the rule, in the absence of an expressed assent on the part of the Wolverton, simply for her own convenience.

The District judge exonerated the Packer on the ground that a "prevailing custom in navigating around the Battery on an ebb tide" gave her the right to insist on keeping near the piers, notwithstanding the inspectors' rule. There may be such a custom, but in the record before us there is not sufficient evidence to prove it. Three witnesses testify to its existence, but twice that number—of equal experience in harbor navigation—swear that, though vessels do frequently pass each other in that way, there is no rule or general custom as to which side of each other they shall go. The mere fact that vessels often agree with each other to depart from the rule when rounding the Battery is not sufficient to excuse a vessel which, without securing assent to such an agreement, takes upon herself the responsibility of departing from it, merely for her own convenience. We are unable to find that the failure of the Packer to obey the rule did not contribute to the collision, and therefore concur with the Circuit Court.

As to the navigation of the Wolverton, it is unnecessary for us to express an opinion, as she is not before the court.

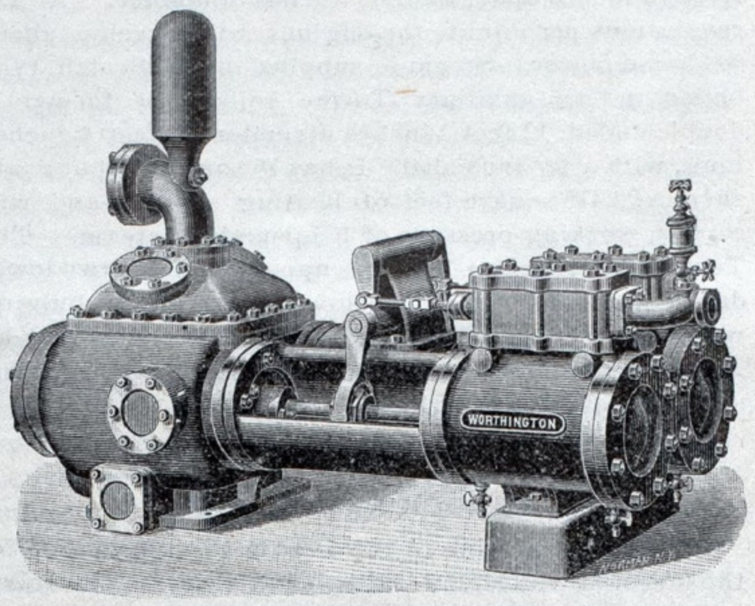
Decree of Circuit Court affirmed, with interest and costs. Fed. Rep., Vol. 58, No. 1.

THE Ellwood Shafting and Tube Co. has recently secured a contract for a large quantity of seamless steel tubing to be used in torpedo boats now being built by the government.

THE WORTHINGTON STEAM PUMP AND CONDENSER.

(ILLUSTRATED.)

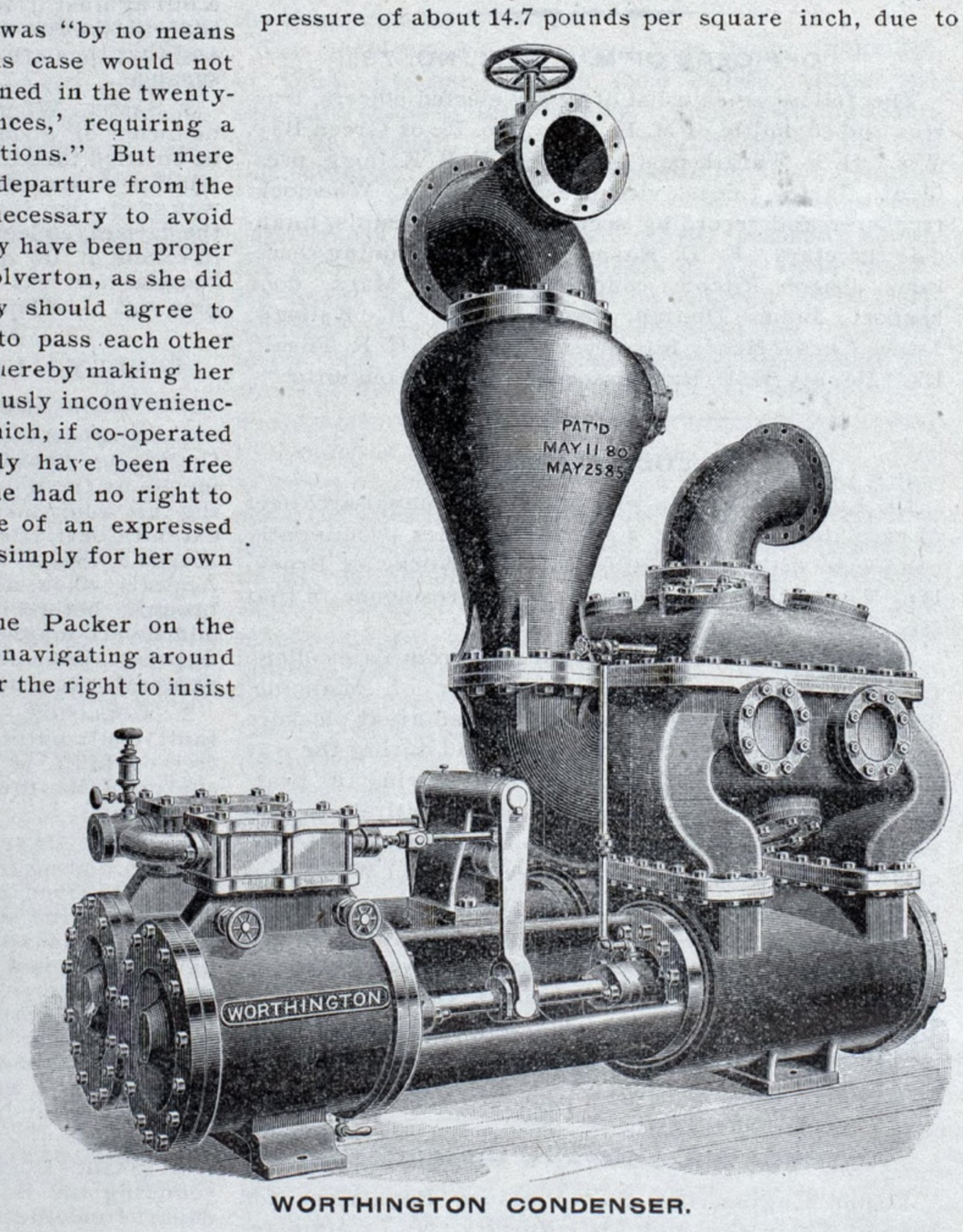
The accompanying cut illustrates the Worthington pump of ordinary pattern, size 10 by 6 by 10, having two double acting plungers or pistons, and fitted with water valves of rubber or metal as required. These pumps are designed for boiler feeding, fire, hydraulic elevator and general service.



WORTHINGTON PUMP.

The stated capacities of the pumps are based upon a piston travel of about 50 to 100 feet per minute. In case of fire or other emergency this speed can be considerably increased.

When steam expands in the cylinder of a steam engine its pressure gradually falls, and ultimately becomes so low that it cannot profitably be used for driving the piston. At this stage a time has arrived when the attenuated vapor should be disposed of by some method, so as not to exert any back pressure or resistance to the return of the piston. If there were no atmospheric pressure, exhausting into the open air would effect the desired object. But, as there is in reality a pressure of about 14.7 pounds per square inch, due to the weight of the superincumbent atmosphere, it follows that steam in a non-condensing engine cannot ecomomically be expanded below this pressure, and must eventually be exhausted against the atmosphere, which exerts a back-pressure to that extent.



WORTHINGTON CONDENSER.

It is evident that if this back-pressure be removed, the engine will not only be aided by the exhausting side of the piston being relieved of a resistance of 14.7 pounds per square inch, but, moreover, as the exhaust or release of the steam from the engine cylinder will be against no pressure, the steam can be expanded in the cylinder quite, or nearly, to absolute zero of pressure, and thus its full expansive power can be obtained.

Contact in a closed vessel with a spray of cold water, or with one side of a series of tubes on the other side of which cold water is circulating, deprives the steam of nearly all its latent heat and condenses it. In either case the act of condensation is almost instantaneous. A change of state occurs and the vapor steam is reduced to liquid water. As this water of condensation only occupies about one sixteen-hundredth of the space filled by the steam from which it was formed, it follows that the remainder of the space is void or vacant and no pressure exists. The expanded steam from the engine is conducted into this empty or vacuous space and, as it meets with no resistance, the very limit of its usefulness is reached.

The vessel in which this condensation of the steam takes place is the condensing chamber; the cold water that produces the condensation is the injection water; and the heated water on leaving the condenser, is the discharge water.

To make the action of the condensing apparatus continuous, the bow of the injection water and the removal of the discharge water, including the water from the liquifaction of the steam, must likewise be continuous.

The space over the mercury in the top of an ordinary barometer tube is the nearest approach to a perfect vacuum. The small amount of vapor of mercury that is present prevents the vacuum from being absolutely complete. This vacuum, however, is taken as the standard to which all lesser degrees of vacuum are referred in making comparisons.

For a similar reason the vacuum in a condenser is not quite perfect, however complete the condensation may be, because the injection water is heated by the steam and emits a vapor of a tension due to the temperature. When the temperature is 126° Fahrenheit, the tension or pressure of the vapor will be represented by about 4 inches of mercury; that is, when the mercury in an ordinary barometer stands at 30 inches, another barometer with the space above the mercury communicating with the condenser will stand at about 26 inches. The imperfection of a vacuum is not wholly traceable to the vapor in the condenser, but also to the presence of air, a small quantity of which enters with the injection water and with the steam; the larger part, however, comes through air leaks in faulty connections and badly packed stuffing-boxes. The air would gradually accumulate until it destroyad the vacuum, if provision were not made to constantly withdraw it, together with the heated water, by means of a pump.

The amount of water required to thoroughly condense the steam from an engine is dependent upon two conditions: the total heat and weight of the steam, and the temperature of the injection water. The former represents the work to be done, and the latter the value of the water by whose cooling agency the work of condensation of the steam is to be accomplished.

Generally stated, with 26 inches vacuum and injection water at ordinary temperature (not exceeding 70° Fahr. from 20 to 30 times the quantity of water evaporated in the boilers (feed water) will be required for the complete liquifaction of the exhaust steam from an engine. The potency of the injection water decreases very rapidly as the temperature increases, and at 80° Fahr. 35 times, and at 90° Fahr. 52 times times the feed water is to be employed. On the other hand, if the temperature be lower, less water is required.

OFFICERS LICENSES SUSPENDED.

Investigation relative to the collision of the steamers Arther Orr and T. H. Smith, on Lake Michigan last season, which resulted in the sinking of the Smith, was completed a few days ago by the local inspectors of steam vessels, William Fitzgerald and Daniel Chipman.

They found C. Z. Montague, master of the Orr, and and Thomas O. Olson, master of the Smith, together with his first mate, John Colwell, guilty of neglecting rules 3 and 4 for the government of pilots, and suspended their license for sixty days.

In their report the inspectors state that they could not discover which steamer was to blame. The collision occurred in a dense fog early on the morning of Nov. 11 off Racine North point. The rules which the inspectors found had been violated provide for blowing steam whistles in a fog.

NOTES.

THE Westinghouse Electric and Manufacturing Co. has declared the usual semi-annual dividend of 3½ per cent. on the preferred stock, payable January 10.

THE new steel boat building by James Rees & Sons, of Pittsburg, for Cuban waters, is almost completed, and is expected to be ready to leave for Cuba this week via New Orleans.

THE Thames Towboat Co., of New London, Conn., having tested the "Providence" windlasses, made by the American Ship Windlass Co., of Providence, R. I., for their tugs, in comparison with the Bath windlass, pronounce the "Providence" machines greatly superior to the Bath machine, and they have now ordered an outfit for tug "Minnie" from the American Ship Windlass Co., similar to the one that they put on the tug "America" a year and a-half ago.

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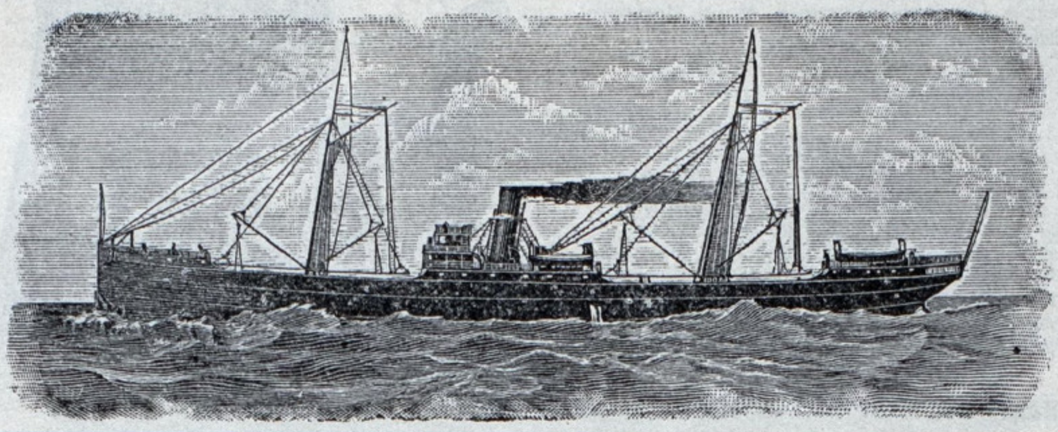

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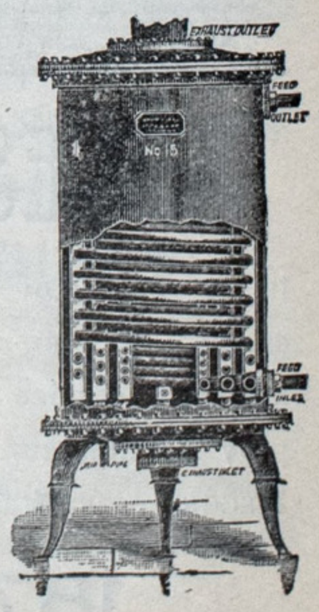

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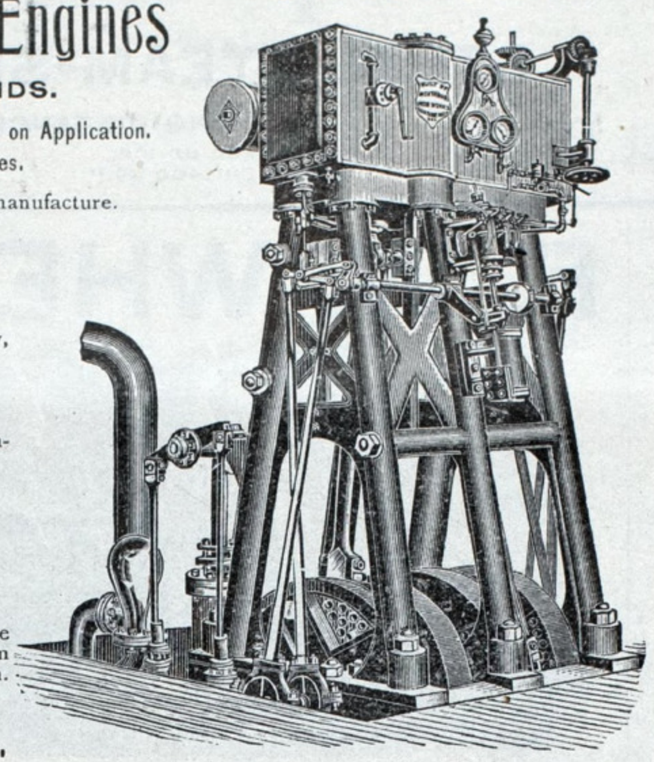

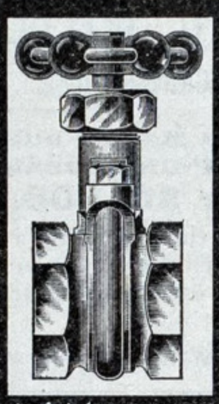

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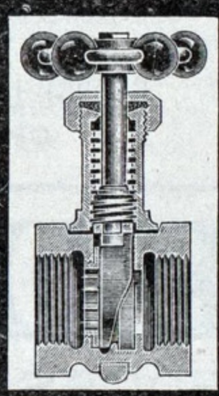

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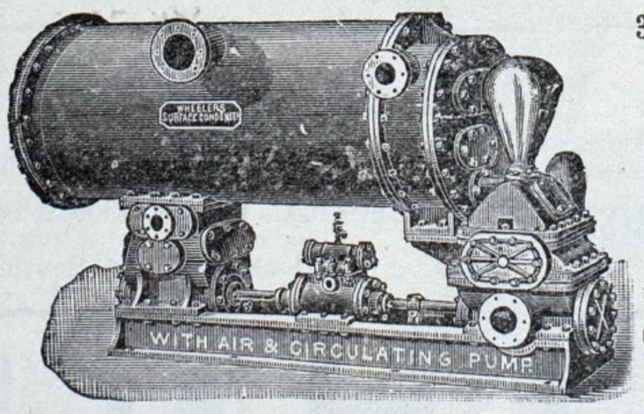

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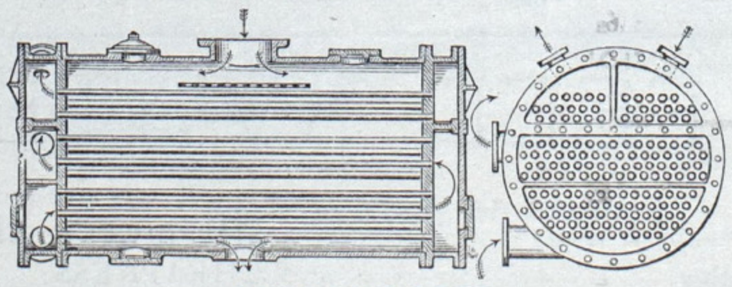

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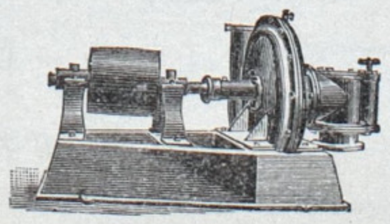

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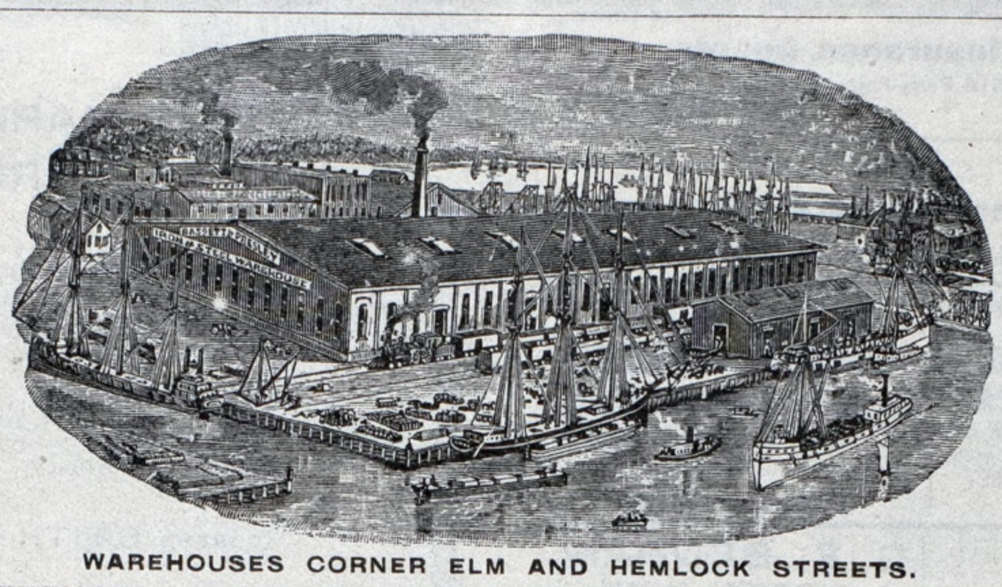

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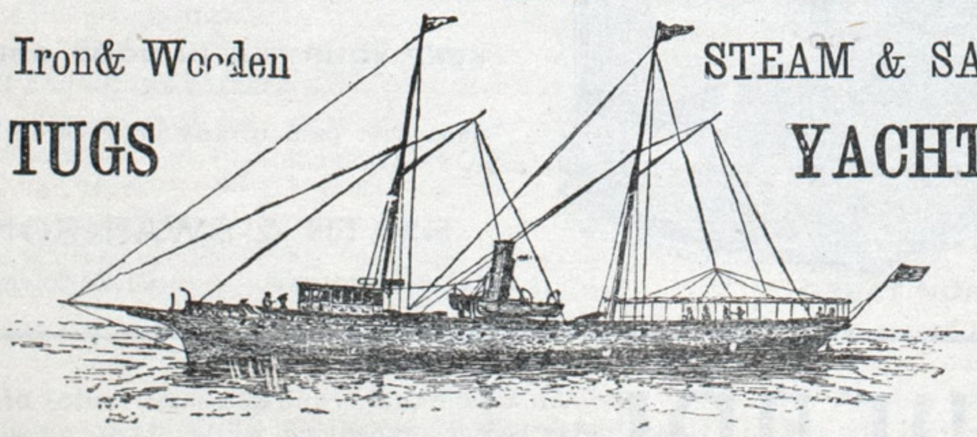

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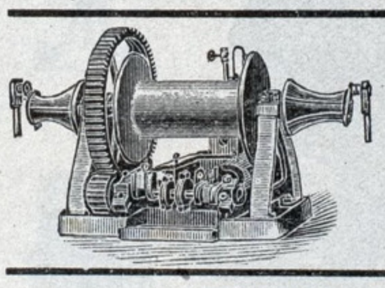

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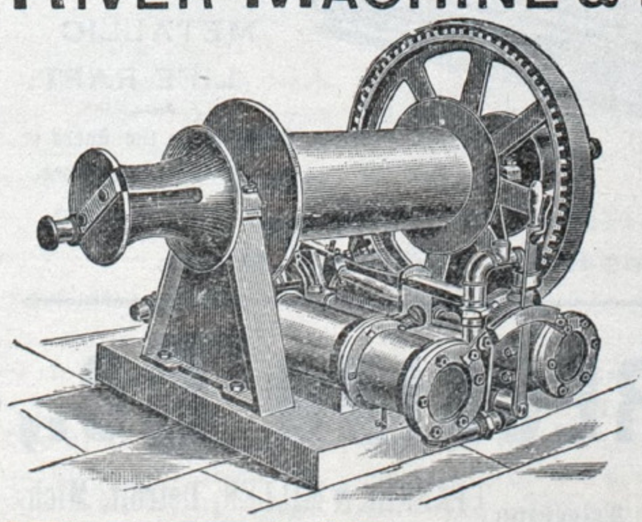

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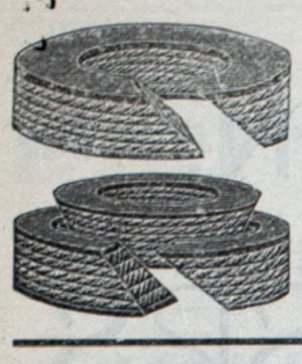

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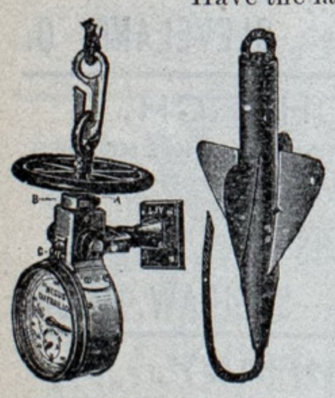

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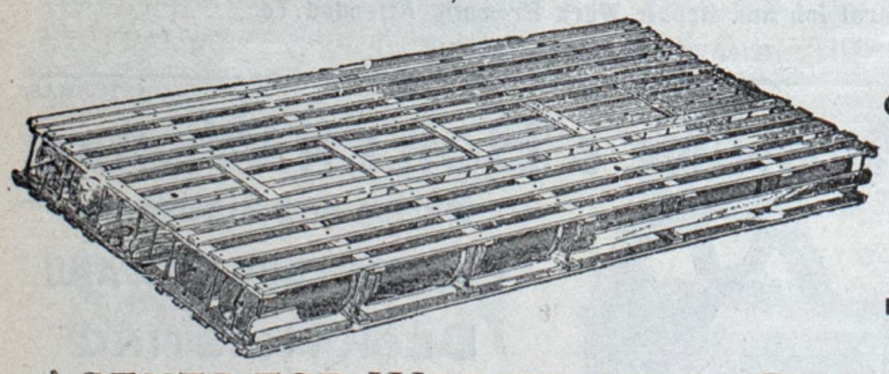

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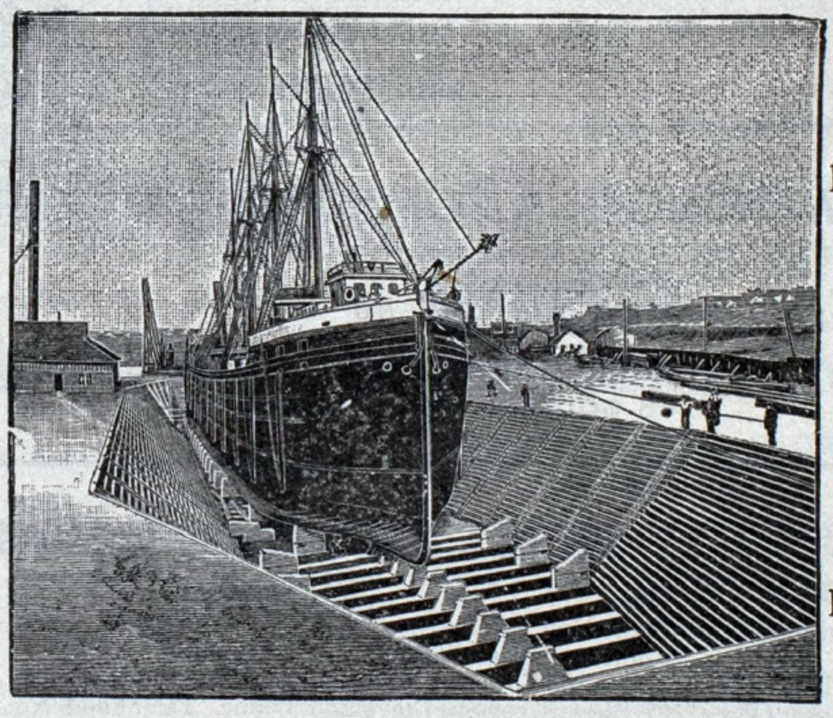

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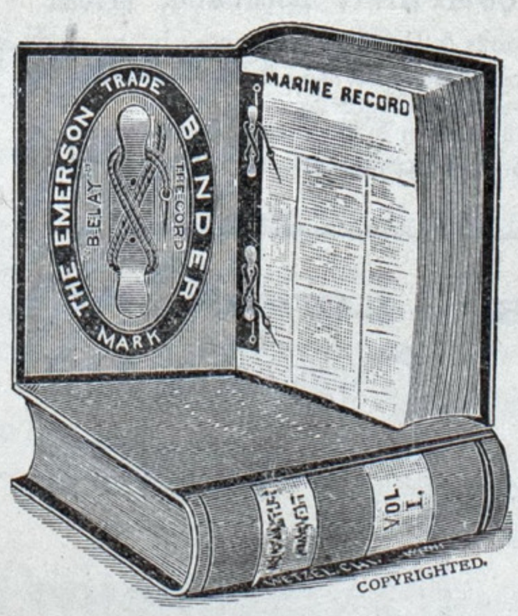

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